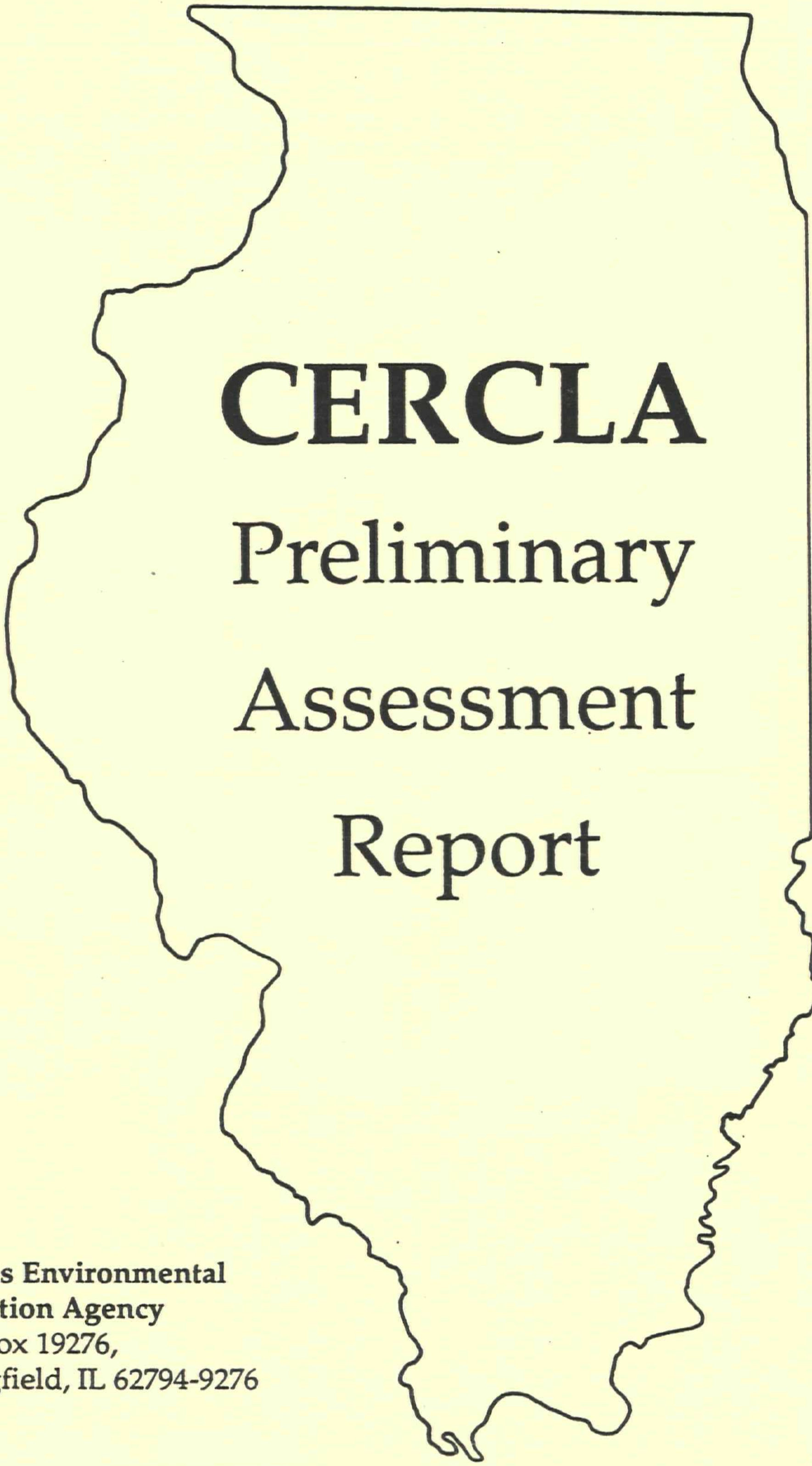
L0310000000 - Cook Co.
Maine Township High School South
ILD9849032237
SF/HRS



CERCLA

Preliminary Assessment Report

Illinois Environmental Protection Agency
P.O. Box 19276,
Springfield, IL 62794-9276

Confidential Material May be Enclosed

CERCLA Preliminary Assessment Report

for

Maine Township High School South

ILD 984903237

Table of Contents

Executive Summary

INTRODUCTION

Maine Township High School South (ILD984903237) was placed on the Comprehensive Environmental Resource Compensation and Liability Inventory System (CERCLIS) list on July 20, 1992 as a site discovery. The site was placed on CERCLIS as a result of the sites potential danger to life and health of wildlife and human populations. This potential stems from a number of factors, as follows: The former landfill over which the high schools' athletic fields are built never had an operating permit issued to it from the Illinois Environmental Protection Agency (IEPA); the landfill has not been active as a landfill for over 30 years; former dumping activities - it is not known what, if any, hazardous materials have been disposed in this facility; four or five teachers/coaches, have been reportedly diagnosed as having cancer or have died of cancer over the years. The Illinois Environmental Protection Agency is performing the Preliminary Assessment (P.A.) under the authority of CERCLA as amended by SARA.

The Preliminary Assessment is being conducted to collect information sufficient to support a decision regarding the need for further action under CERCLA/SARA. The assessment will investigate & discuss the type of site, operational history, the four environmental pathways (groundwater migration, surface water migration, soil exposure and air migration) and the environmental hazards associated with the site. There are no RCRA implications or actions associated with this site as it opened, operated and closed prior to the existance of any regulatory agency or enforcable requirements.

Maine Township High School South is located in Park Ridge, Illinois north of the northeast corner of the intersection of Devon Avenue and Dee Road in Maine Township, Cook County (see Figure 1). The high school structures and property occupy approximately 60.0 acres of land owned by the Park Ridge School District of which a portion was formerly a landfill near the above mentioned intersection. The site specific location of Maine South is described as follows: portions of the site lie in the NW 1/4 and SW 1/4 of the SE 1/4 of Section 34, T.41N.-R.12E. (see Figure 2).

Approximately 35 acres of the northern portion of the property was landfilled beginning in 1940 and ending in 1960. None of the school buildings are built over the landfilled areas. These structures have been built on farmed or open ground. The remaining property is comprised of manicured, maintained lawn, shrubs and trees. Athletic fields (practice and game fields) are also present on the maintained areas north of the school structures. The athletic fields were constructed in their entirety over the main fill areas of the landfill. Tennis courts and a soccer field have been constructed on the southern portion of the property, which was formerly a privately owned residence. Bushes and trees are located throughout the property. The former landfill is situated in the southwest corner of Park Ridge in an area which has been urban since the landfill began operating. Bordering the site on the north is Talcott Avenue, across which was and is residential, south by Devon Avenue across which is Cook County Forest Preserve, east by residential subdivisions and west by Dee Road across which is Cook County Forest Preserve and the Des Plaines River.

HISTORY

The subject landfill initially began operating under the name of Redding Coal & Material in 1940. The landfill remained as such into the 1950's when the name changed to C. Groot & Company. The landfill was known by this name until the owner of the land signed the property over to the school district in March 1960 after the school district aquired the land through implementation of eminent domain. Wastes originally to be accepted for disposal were domestic and/or household refuse, putrescible waste, combustibles, industrial wastes and construction/demolition debris. Toxic waste was not to be accepted. Operational procedures consisted of refuse being placed on existing land surface in piles, being spread and covered at the end of the day. Being located in an area with the soil characterized as somewhat to poorly drained silty, clayey, glacial till, and the base of the fill being approximately 25 feet above groundwater level, susceptibility of waste coming into direct contact with groundwater is low. One wetland area is located on site (pond) with a small number of wetlands associated with the Des Plaines River west of the site. Because the landfill was established and closed prior to the IEPA and its regulations and permitting program, the landfill operated unregulated with little or no record keeping. In light of this, there are no known records of what actually was disposed. Also, there was never a CERCLA 103(c) Notification of Hazardous Waste submitted to the IEPA indicating substances being hauled to and disposed of at the site. Monitoring of the site has never taken place since its establishment and closure was prior to any mandatory monitoring requirements. After the landfill ceased operations in 1960, final cover was applied making it ready for school district use. There have been no complaints registered against the former landfill since its closure and construction of the school, other than the mentioned occasional surfacing of refuse in the athletic fields. Review of a number of aerial photographs dating from 1946 to 1988 has revealed two ponds on site in 1959 but no areas of obvious contamination. The photos show that in 1946 there were no ponds present. All dumping occurred in the northern one-third of the site and appeared to consist of household/ domestic refuse and daily cover material. Ponds do appear in the 1959 photo adjacent to the central-western portion of the site. At this writing the former property owner(s) of the land on which the ponds were located has not been found. The ponds appear to have been excavated for the soil material contained at those locations. Groundwater then began filling the excavations creating the ponds. No wastes were known to have been placed into them. Dumping was again noted in the northern one-third of the site with a small amount of previously excavated and unused material in place in the center of the northern most pond. Various small piles of what appears to be excavated material existed adjacent to each pond. The 1968 photo shows the completed high school. Superimposing the 1968 photo over the 1959 photo reveals that only one building was constructed over any excavated area. As previously noted, this building was constructed over the northern most pond. None of the other school structures have been constructed over any excavated or fill areas. These structures were built on land used for farming row crops as corn or soy beans.

SITE RECONNAISSANCE

A CERCLA pre-remedial site reconnaissance was conducted on July 23, 1993, by Kenneth W. Corkill of the Illinois Environmental Protection Agency (IEPA). The site which was formerly a landfill was observed to be totally covered by Maine Township High School South and its related facilities (see Figure 3). Speaking with City of Park Ridge personnel it appears that the former landfill was almost totally unrestricted as there was only a steel cable across the site access road. The cable was to prevent access to the facility during hours when the site was not open for business. Inspecting the site, it was observed that there were no visible signs of the former facility. A pond along the central-west edge of the site around which the high school entrance road is built was the southern most of two ponds visible on a May 11, 1959 aerial photo of the site. The pond in its current form and shape is very similar to its former appearance but is slightly wider and shorter now. The other pond was filled in, covered and had a school structure constructed over it. These ponds, however, were on an adjacent piece of property with different owners and were not part of the property associated with the landfill. At the time of the reconnaissance there was limited outside activity as school was in session. Conversations with the City of Park Ridge Environmental Health Officer indicated that the pond was not a storm water retention basin nor was he aware of any problems or contamination associated with the pond. He did indicate that on various occasions, trash does work its way to the surface on the athletic fields north of the school structures. Recalling one instance were this occurred, a shallow trench had to be dug on one of the athletic fields to repair an under ground pipe. Cover material was removed along with landfilled material. The trench was less than two feet deep. The excavated landfilled material was removed by a waste hauler and taken to another landfill. Recreational use is high at this site for both the student population and the general public when school activities are not occupying the facilities. The location of former dumping activities and the current site appearance may be seen on the aerial photographs indicated as Figure 4. There were no reports of visual anomalies in the soil or noxious odors when excavation took place upon initiation of construction of the school. This could be partially due to the fact that the school was built south of the main fill areas. Refuse is indicated to have consisted of household/domestic waste, tannery waste, scrap metal, old household appliances, broken up concrete, cans, bottles, various auto/truck parts, tires, and a variety of plastic products. Soil on site consists of medium brown to tan, sandy silt and silty-sandy clay covering the entire site. Concrete is utilized as roadway material for all roads and tennis courts. The site is basically flat with slope running toward the west. The northern portion of the property (the landfilled area) on which the athletic fields are located is approximately five feet higher than the central and southern portions of the site due to fill and cover of the old landfill. The far northern portion of the landfilled area was noted to be at the same level as the residential areas and roadways which indicate that a limited amount of fill was placed into this far northern section of property. Site run-off from paved areas is collected into area drains or curb drains which lead to City of Park Ridge combined sewers flowing to the sewage treatment plant. Precipitation on non-paved areas either runs off to paved areas or infiltrates into the soil. Even though site surface drainage follows the mentioned westerly flow, it is doubtful that any would reach the Des Plaines River as overland flow. The river is approximately 1250 feet west of the site in the center of land designated as forest preserve which includes wetlands. Any surface water from the site, if not collected by area and curb drains on site, which might progress across Dee Avenue would be collected in curb drains on the west side of Dee. Because of the elevation of forest preserve land adjacent to Dee Avenue being higher than Dee Avenue, no run-off would flow beyond the west curb. The only instance in which site run-off might contact the river is if the river was in flood stage and migrated toward the site. Since the sites closure almost thirty years ago, there have been no complaints regarding odors, leachate seeps or foul tasting drinking water. Site photos are located at the end of the PA package along with a photo location map.

The nearest residential property was noted to exist immediately adjacent to the entire eastern property boundary of the site, sharing a common fence. Additional residential areas surround the site except to the west which is forest preserve. Surface topography is relatively flat on and immediately around the site. Beyond the immediate site area the topography is basically flat with a few areas of gently rolling terrain. There are no industrial facilities within close proximity of the former landfill. Industrial and light industrial businesses do however, exist beyond two miles from the site. Commercial properties are spread throughout the designated target distance limits of the landfill/school. Land use within the four mile radius of the site is urban with the exception of land designated as forest preserve. The urban area consists of predominantly single family dwellings with a large number of multi-family complexes distributed throughout the area. Also prominent within the target distance limits are a variety of hotels and motels. This is due to proximity to major highways, interstates and O'hare Airport which is 1.5 to 2.0 miles west of the site.

MIGRATION/EXPOSURE PATHWAYS

Groundwater Migration

The site is located on a localized, relatively flat area on the slightly rolling Lake Border Morainic System of Wisconsinan age (see Figure 5). Specifically, the site is located on the Chicago Lake Plain just west of the Park Ridge glacial moraine. The top of the landfill is now approximately 5 feet higher than the surrounding terrain due to filling. Landfill material has been placed on Franklin-Brice series soil which is somewhat poorly to poorly drained, slowly permeable silty, clay glacial till. The soil originates from Quaternary glacial drift and unconsolidated deposits (see Figure 6). This type of soil in the vicinity of the old landfill can be up to 60 inches thick. Below the described soil is Quaternary glacial drift deposits.

Quaternary glacial drift deposits in Cook County vary in thickness from approximately 90 feet in the southeastern part of the county to more than 300 feet in the west-central portion of the county. These deposits at the site location are approximately 100 feet thick. Surficial sand and gravel deposits of the Mackinaw Member of the Henry Formation are also present at the site location. These generally well sorted and evenly bedded sand and gravel deposits of glacial outwash origin, when encountered, offer the possibility for development of moderate quantities of water (50-200 gpm) from individual wells. Deeper sand and gravel deposits are present at various locations in the county and where sufficiently thick also offer potential for developing moderate to large quantities of water from individual wells. The glacial drift deposits in the Park Ridge area are approximately 100-140 feet thick and overlie Silurian age dolomite of the Niagaran-Alexandrian Series which is approximately 110 feet thick. This geohydrologic system is referred to as the shallow upper dolomite aquifer. The water yielding capability of the dolomite depends upon the number, size and degree of interconnection of water-filled cracks and crevices within the rock. In some areas the dolomite directly underlies permeable glacial deposits of water-bearing sand and gravel. Under such geohydrologic conditions, an exchange of water from the drift to the bedrock is possible. Beneath the Silurian Dolomite is the Ordovician age Maquoketa Group composed primarily of nonwater-bearing shale which separate the Silurian aquifer from the deeper lying water-bearing units. These shales lie at approximately 350 feet in depth and are approximately 210 feet thick. The Maquoketa Group generally is not considered as a source for water, however, locally, small supplies for domestic use may be obtained from minor systems of cracks and crevices in the more dolomitic portions of these rocks, usually found in the upper part of the middle unit of this group. Below the Maquoketa Group is a thick sequence of hydrologically connected rocks referred to as the Cambrian-Ordovician aquifer. This aquifer system consists in downward order of the Galena-Platteville Dolomite, the Glenwood-St. Peter Sandstone, Eminence-Potosi Dolomite, Franconia Formation and the Ironton-Galesville Sandstone. This sequence is referred to as the Cambrian-Ordovician aquifer. Below the Ironton-Galesville Sandstone lies the Eau Claire Formation. The upper and middle portions of the Eau Claire are composed primarily of nonwater-bearing shales that separate the Cambrian-Ordovician aquifer from the deeper Elmhurst-Mt. Simon Sandstone aquifer. The Elmhurst Sandstone Member at the base of the Eau Claire Formation and the underlying Mt. Simon Sandstone are hydrologically connected forming the mentioned aquifer. This aquifer is the deepest fresh water aquifer in northern Illinois lying between 1550 to 1700 feet deep and ranges in thickness from 1200 feet in the northwest part of the county to 2000 feet in the southeast part. Wells penetrating this aquifer usually extend only a few hundred feet as the water quality deteriorates (highly mineralized) with depth.

Within a four mile radius of Maine Township High School South and the old landfill there are three aquifers available for extraction of drinking water: 1) Glacial drift composed of silt, clay, sand and gravel. 2) Silurian Dolomite composed of varying types of dolomite. 3) Cambrian-Ordovician composed of varying types of dolomite and sandstone. There are no public water distribution systems utilizing groundwater located within a four mile radius of Maine Township High School and the old landfill. There are, however, approximately 10 private wells utilizing both the sand and gravel deposits in the unconsolidated glacial drift above bedrock and the Silurian Dolomite aquifers for drinking water supplies within four miles of the site. The nearest private well, serving four residents, is approximately 50 feet east of school district property and 75 feet east of the landfilled area. The other private wells are situated north, south and east of the site and sporadically located.

Persons within four miles of the site are served through public water systems acquiring water from Lake Michigan via the City of Chicago. An accurate count of the number of private water well users within the four mile radius of the site is unavailable as the municipalities do not have records or accurate records of these. City officials in Park Ridge have estimated that approximately 50 persons are using private wells within a two mile radius of the site. The closest private well uses the sand and gravel aquifer of concern and is, according to local residents, 120 feet deep. The Illinois Department of Public Health has a listing of 51 non-community public water supply wells within four miles of the site. These wells are located in the forest preserves and picnic areas associated with the Des Plaines River and the North Branch of the Chicago River.

Based on information obtained and presented above, the Glacial Drift and Silurian Dolomite aquifers are considered the aquifers of concern in the area surrounding the site. Groundwater in the aquifers of concern has been encountered at depths between approximately 25 and 90 feet. Since the Maquoketa Group is a confining layer beneath the Silurian Dolomite the Cambrian-Ordovician aquifer would not be considered a concern for potential contaminant intrusion.

Groundwater movement in the glacial drift aquifer has not been determined at this time. Groundwater movement in the Silurian Dolomite bedrock aquifer is assumed to be toward the east following the 10 to 15 feet per mile easterly dip of the beds of dolomite and shale as indicated by the Illinois State Water Survey, Bulletin 60-20 and 60-32. Groundwater in the unsaturated zone of the glacial drift may ultimately discharge into nearby wetlands and the Des Plaines River located west of the school and landfill.

Surface Water Migration

Surface water runoff from the landfilled area of the site tends to flow, if at all, in a radial pattern away from the center of the athletic fields and into storm drains in the streets and driveways around its perimeter. Most moisture on the athletic fields will infiltrate into the soil. Run-off for the remainder of the school property flows in all directions, however, generally toward the west and into area or curb drains. Drainage patterns of the area viewed on topographic maps and aerial photographs were visually verified during the site reconnaissance. Drainage from the site, as mentioned previously, does not flow into the forest preserve and wetlands west of the site due to engineered topography, roadways and drainage systems. Therefore, there is no 15-mile drainage route, no probable point of entry (PPE) to surface water, no surface water intakes and no fisheries associated with this site. The wetland on site is described as palustrine, open water, intermittently exposed, excavated. Wetlands near the site exist as: palustrine, open water, intermittently exposed, excavated; palustrine, forested, broad-leaved deciduous, seasonally flooded; palustrine, forested, broad-leaved deciduous, temporarily flooded and riverine, lower perennial, open water, permanently flooded (see Figure 7).

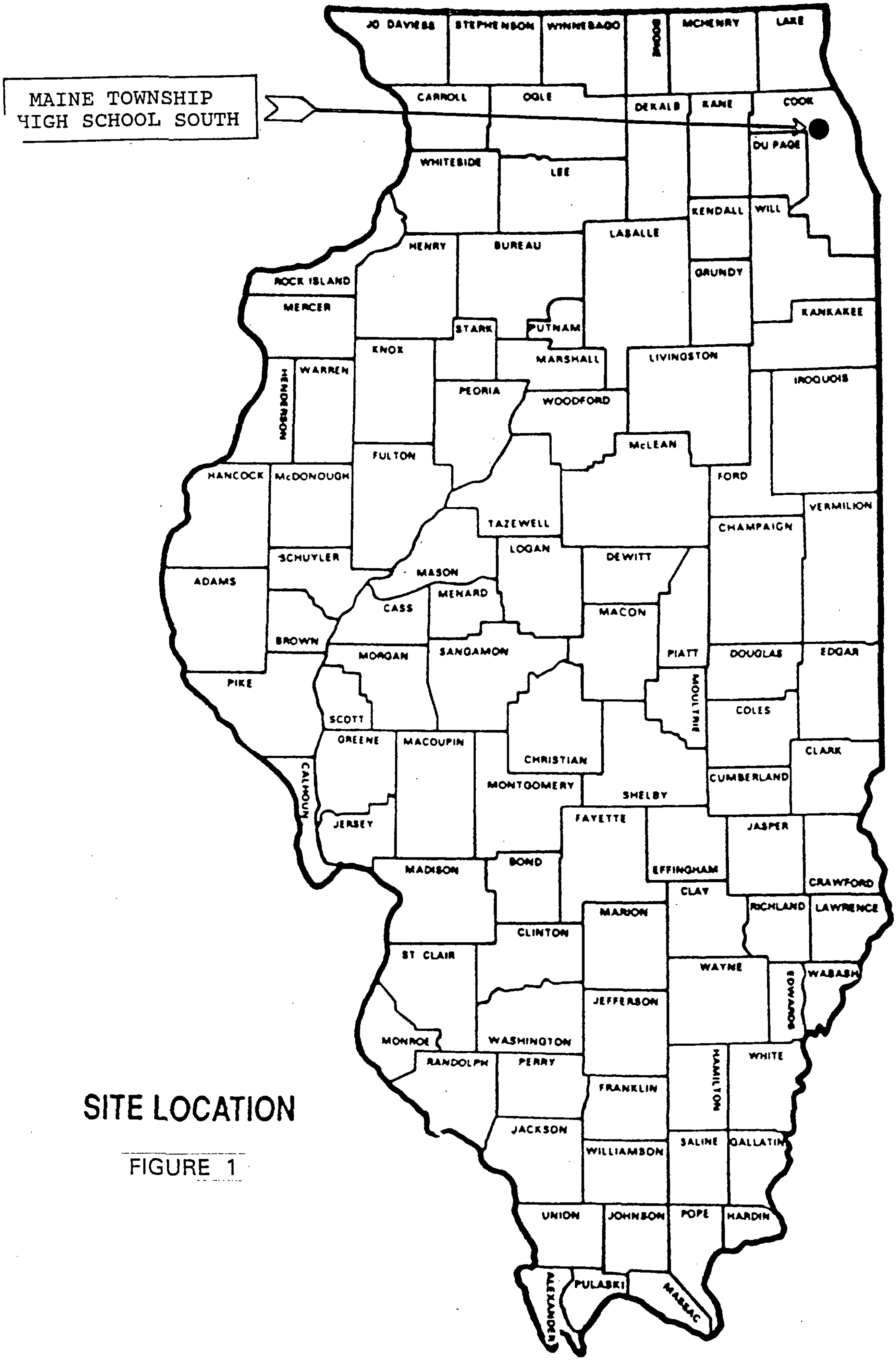
Soil Exposure and Air Migration

Over the past thirty years there have been no reports of observable leachate problems, odors, surface contamination or physical indications that the landfills' integrity has been compromised. The landfill does have a functional cap over it as the result of closure activities as well as the school districts efforts to level off areas of subsidence. The thickness of cover material is not known thus making it difficult to determine its effectiveness on limiting or containing movement and releases of any possible volatile constituents and trapped gases. Soil contamination has not been confirmed on-site or off-site at this time, as no soil samples have been taken. During the activities on-site when the landfill was active and during construction of the school various degrees of surface disturbance has occurred with no reports of any visual anomalies. As previously mentioned, foul and/or noxious odors have not been reported. In 1960, at the time of closing, there were between 2-5 employees present. These workers could have potentially contacted contaminated waste, soil and/or breathed contaminated air. Individuals involved with site activities during school construction would not have been in contact or potential contact with wastes as construction did not take place over landfilled areas. Contact potential associated with the northern portion of the site may continue depending on future site activity. Depth, below current grade, to any possible waste on site is unknown. Within a 4-mile radius of the site the population is calculated to be approximately 165,300 persons. The nearest individual and regularly occupied building is a residential dwelling located 25 feet south of one of the southern property lines. There are no daycare facilities on-site or within 200 feet of the site, however, the high school is located on site.

Evaluation of the Cancer Concern

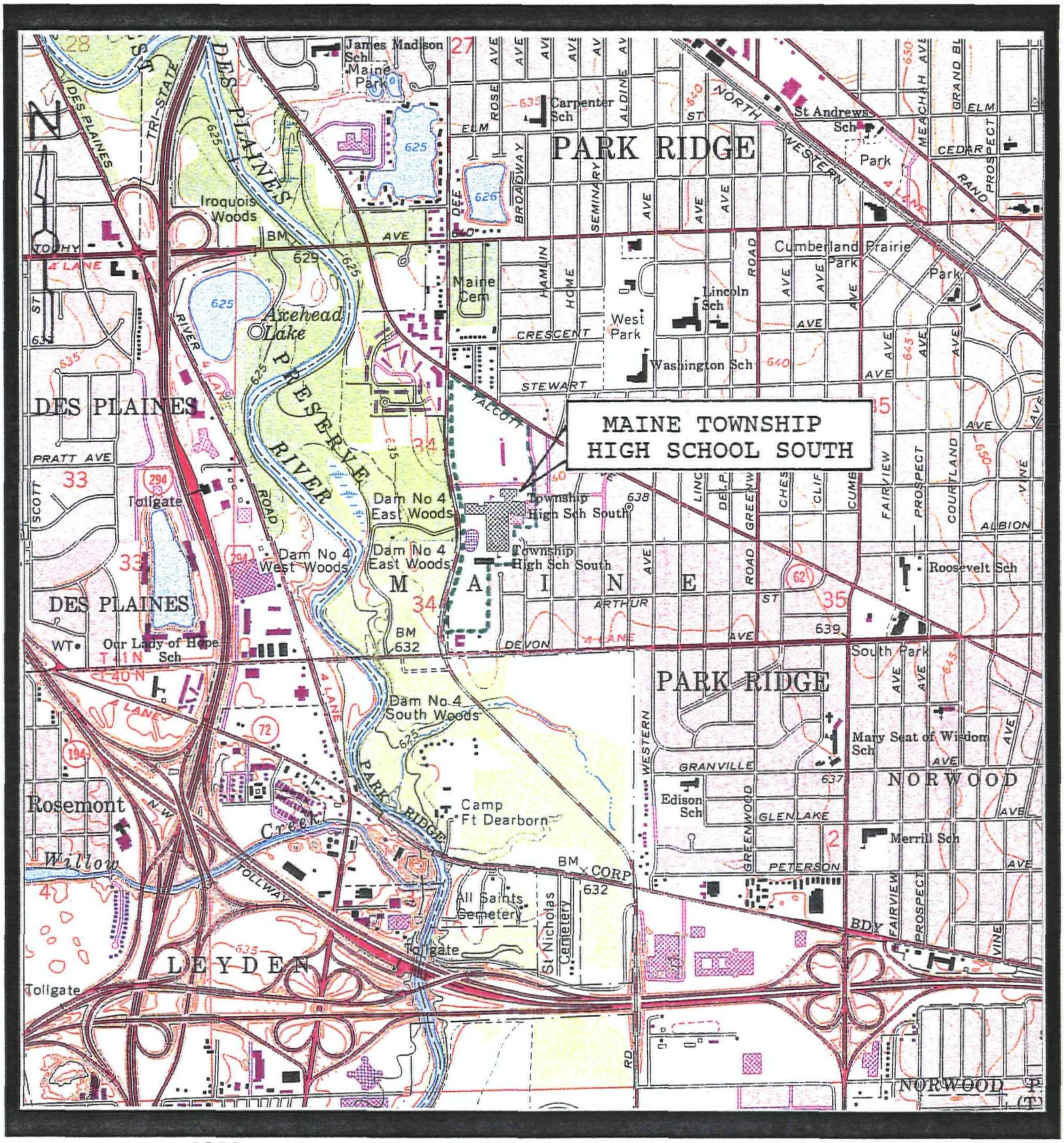
To address the concern regarding the faculty members developing cancer, the Illinois Department of Public Health (IDPH) was consulted. IDPH was provided with all available information in order to make an appropriate evaluation of the situation. The findings are as follows: "Cancer is the second leading cause of death in this county and approximately one of three people will develop cancer in their lifetimes. It should be made clear, however, that cancer is actually many diseases, many with different causes and looks. In many respects, cancer can be defined as a disease of age and lifestyle since its frequency increases with age and lifestyle choices...only 5-10% of cancers are assumed to have an occupational/environmental cause. The regrettable fact that five of your faculty developed a cancer is certainly of concern, but I view it as unlikely that they have a cause rooted in their possible exposure to constituents associated with the landfill. The cancers are referred to as "different" which weakens the case for their having similar causes (additionally, we would need to confirm that cancer was actually diagnosed in these individuals). There is also no information given as to the actual tumor types, the time frame of cases, the age of the victims, whether they smoked or not, hobbies, past occupations and other associated confounding factors. What you have reported is a clustering of cases which seem significant because of the number and proximity of the individuals to one another. This is, however, an artificial situation since the individuals are together based on their jobs. The actual time spent in the area of concern is probably small compared to the time spent off the field, as well as away from school. This in conjunction with the lack of any known exposure to any landfill constituents in general and any potential carcinogens in particular make the link between the two observations very tenuous".

SECTION 2



SITE LOCATION

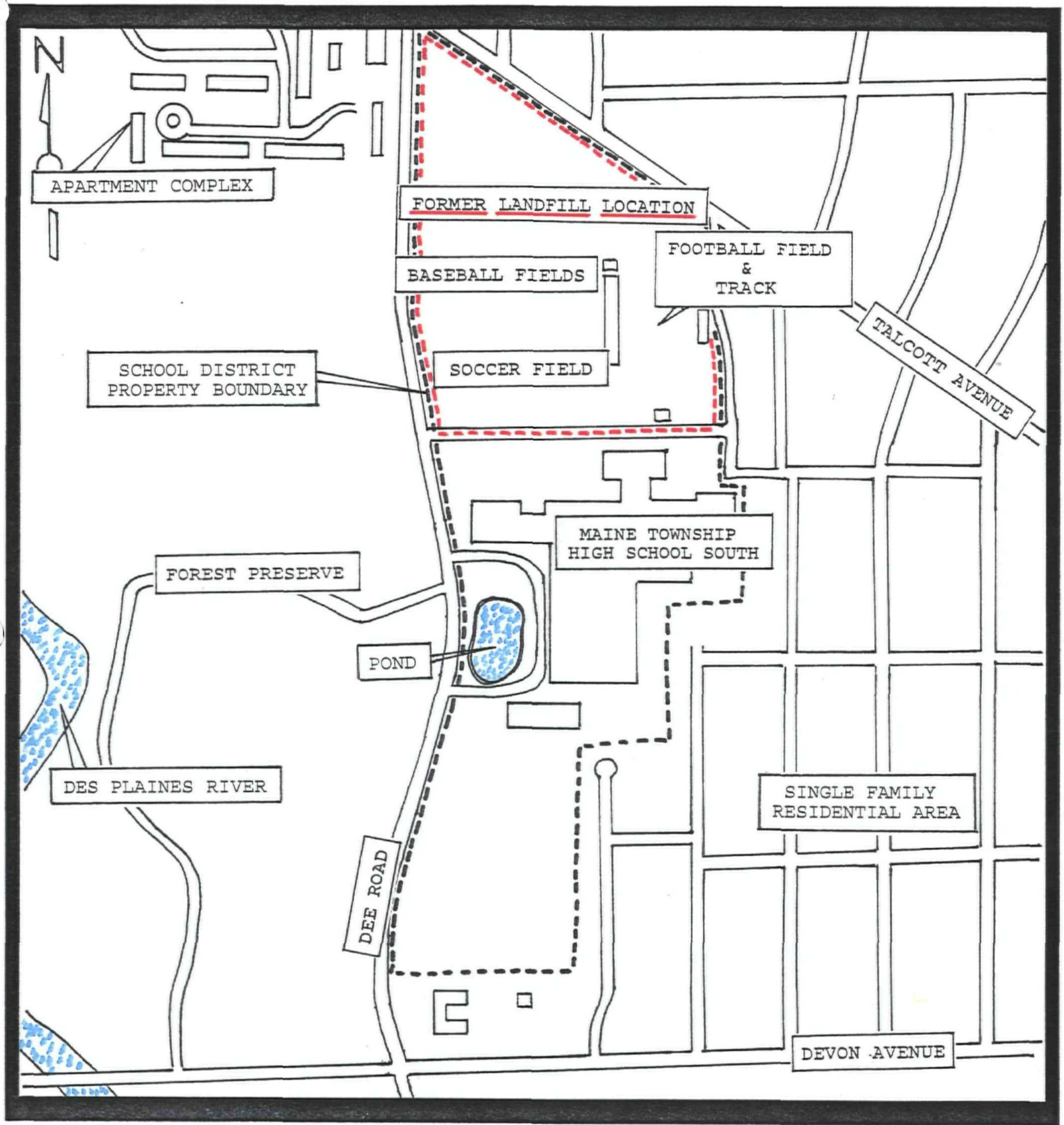
FIGURE 1



SOURCE: IEPA, 1993. BASE MAP: USGS 1980, 7.5 MIN. PARK RIDGE QUAD.

SITE MAP

FIGURE 2



SOURCE: IEPA, 1993. BASE MAP: USGS 1980, 7.5 MIN. PARK RIDGE QUAD.

SITE FEATURES MAP

FIGURE 3

SDMS US EPA Region V

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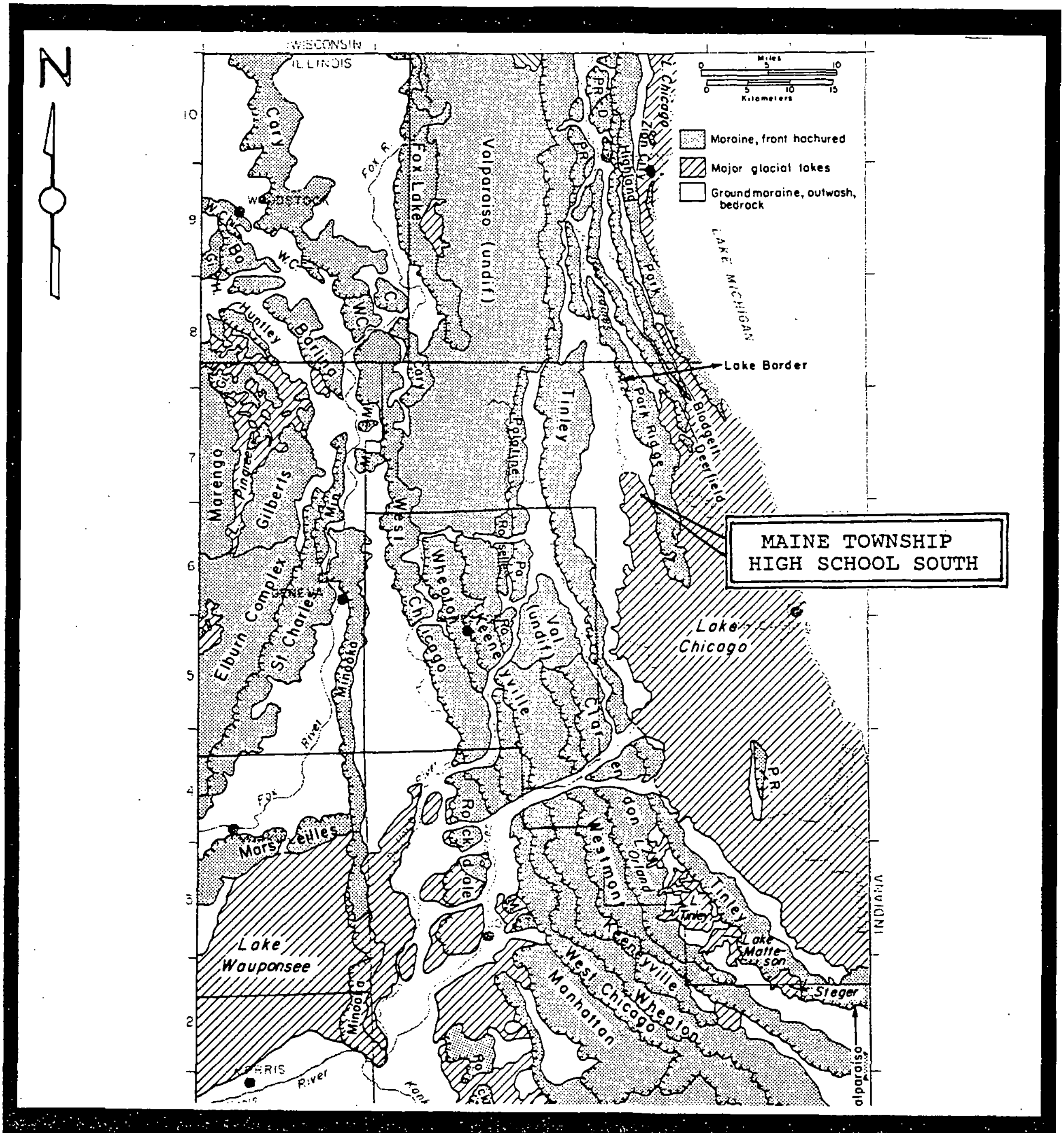
AERIAL PHOTOGRAPH – FIGURE 4

☐ **Other:**



SOURCE: IEPA, 1993. REFERENCE: ISGS 1973, GEOLOGY FOR PLANNING IN COOK COUNTY, ILLINOIS.

GLACIAL MORAINE SYSTEM IN COOK COUNTY

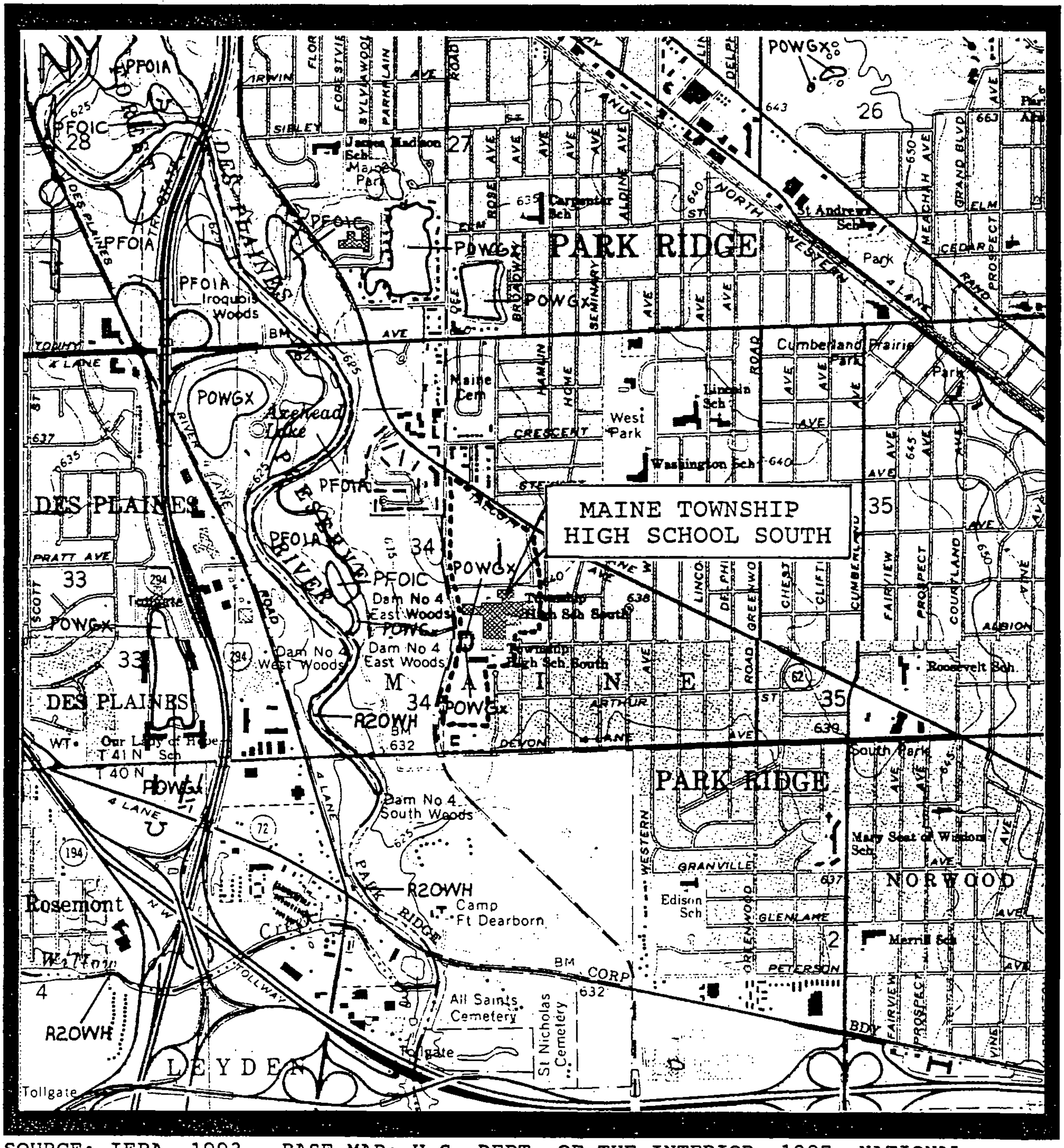
FIGURE 5

Time Stratig.			Rock Stratigraphy			GRAPHIC COLUMN	Thickness (Feet)	KINDS OF ROCK
SYSTEM	SERIES	STAGE	MEGA-GROUP	GROUP	FORMATION			
QUAT.	PLEIS.				(See fig. 15)		0-350	Till, sand, gravel, silt, clay, peat, marl, loess
PENN.	DESM.			Kewanee	Carbondale		0-125	Shale, sandstone, thin limestone, coal
					Spoon		50-75	As above, but below No. 2 Coal
MISS.	VAL.				Burl.-Keokuk		0-700	Limestone — Only in Des Plaines Disturbance
	KIND.				Hannibal			Shale, siltstone — Only in Des Plaines Disturbance
DEV.	UP.				Grassy Creek		0-5	Shale in solution cavities in Silurian
SILURIAN	NIAGARAN		Hunton		Racine		0-300	Dolomite, pure in reefs; mostly silty, argillaceous, cherty between reefs
					Waukesha		0-30	Dolomite, even bedded, slightly silty
					Joliet		40-60	Dolomite, shaly and red at base; white, silty, cherty above; pure at top
	ALEX.				Kankakee		20-45	Dolomite; thin beds; green shale partings
					Edgewood		0-100	Dolomite, cherty, shaly at base where thick
ORDOVICIAN	CIN.	RICH.		Maquoketa	Neda		0-15	Oolite and shale, red
					Brainard		0-100	Shale, dolomitic, greenish gray
					Ft Atkinson		5-50	Dolomite, green shale, coarse limestone
		MAY. / ED.			Scales		90-120	Shale, dolomitic, gray, brown, black
	CHAMPLAINIAN	TRENT.	Ottawa	Galena	Wise Lake		170-210	Dolomite, buff, pure
					Dunleith			Dolomite, pure to slightly shaly; locally limestone
					Guttenberg		0-15	Dolomite; red specks and shale partings
		BLACKRIVERAN		Platteville	Nachusa		0-50	Dolomite and limestone, pure, massive
					Grand Detour		20-40	Dolomite and limestone; medium beds
					Mifflin		20-50	Dolomite and limestone, shaly, thin beds
					Pecatonica		20-50	Dolomite, pure, thick beds
				Ancell	Glenwood		0-80	Sandstone and dolomite, silty; green shale
					St. Peter		100-600	Sandstone, medium and fine grained; well rounded grains; chert rubble at base
	CANADIAN		Knox	Prairie du Chien	Shakopee		0-70	Dolomite, sandy; oolitic chert; algal mounds
					New Richmond		0-35	Sandstone, fine to coarse
					Oneota		190-250	Dolomite, pure, coarse grained; oolitic chert
					Gunter		0-15	Sandstone, dolomitic
CAMBRIAN	CROIXAN	TREMP.			Eminence		50-150	Dolomite, sandy
					Potosi		90-220	Dolomite; drusy quartz in vugs
		FRAN.			Franconia		50-200	Sandstone, glauconitic; dolomite; shale
					Ironton		80-130	Sandstone, partly dolomitic, medium grained
		DRESBACHIAN			Galesville		10-100	Sandstone, fine grained
					Eau Claire		370-570	Siltstone, dolomite, sandstone and shale, glauconitic
			Potsdam		Mt. Simon		1200-2900	Sandstone, fine to coarse; quartz pebbles in some beds
PRE-CAM.								Granite

SOURCE: IEPA, 1993. REFERENCE: ISGS 1973, GEOLOGY FOR PLANNING IN COOK COUNTY, ILLINOIS.

GENERALIZED COLUMN OF GEOLOGIC FORMATIONS IN COOK COUNTY

FIGURE 6



SOURCE: IEPA, 1993. BASE MAP: U.S. DEPT. OF THE INTERIOR, 1987, NATIONAL WETLAND INVENTORY, 7.5 MIN. PARK RIDGE QUAD.

WETLAND MAP

FIGURE 7

SDMS US EPA Region V

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4-MILE RADIUS MAP

☐ **Other:**

SECTION 3

DATE: September 22, 1993

TIME: 3:00 p.m.

PHOTOGRAPH TAKEN BY:

Ken Corkill

PHOTO NUMBER: 1

LOCATION: L0310000000

Maine Twp. H.S. South

ILD 9849093237

PICTURE TAKEN TOWARD: NNE

COMMENTS: Picture taken of southern most portion of site toward main school structures.

DATE: September 22, 1993

TIME: 3:00 p.m.

PHOTOGRAPH TAKEN BY:

Ken Corkill

PHOTO NUMBER: 2

LOCATION: L0310000000

Maine Twp. H.S. South

ILD 984903237

PICTURE TAKEN TOWARD: ENE

COMMENTS: Picture is taken toward the soccer field & tennis courts at the southern most portion of the property.

DATE: September 22, 1993

TIME: 3:00 p.m.

PHOTOGRAPH TAKEN BY:

Ken Corkill

PHOTO NUMBER: 3

LOCATION: L0310000000

Maine Twp. H.S. South

ILD 9849093237

PICTURE TAKEN TOWARD: S

COMMENTS: Picture taken of property south of Maine Twp. H.S. toward intersection of e Road and Devon Ave.

DATE: September 22, 1993

TIME: 3:10 p.m.

PHOTOGRAPH TAKEN BY:

Ken Corkill

PHOTO NUMBER: 4

LOCATION: L0310000000

Maine Twp. H.S. South

ILD 984903237

PICTURE TAKEN TOWARD: NE

COMMENTS: Picture is taken toward on-site pond & student ıter, administration office in main building of school.

DATE: September 22, 1993

TIME: 3:10 p.m.

PHOTOGRAPH TAKEN BY:

Ken Corkill

PHOTO NUMBER: 5

LOCATION: L0310000000

Maine Twp. H.S. South

ILD 9849093237

PICTURE TAKEN TOWARD: N

COMMENTS: Picture taken of on-site pond at main entrance of school and of Dee Road. Forest Preserve on left.

DATE: September 22, 1993

TIME: 3:20 p.m.

PHOTOGRAPH TAKEN BY:

Ken Corkill

PHOTO NUMBER: 6

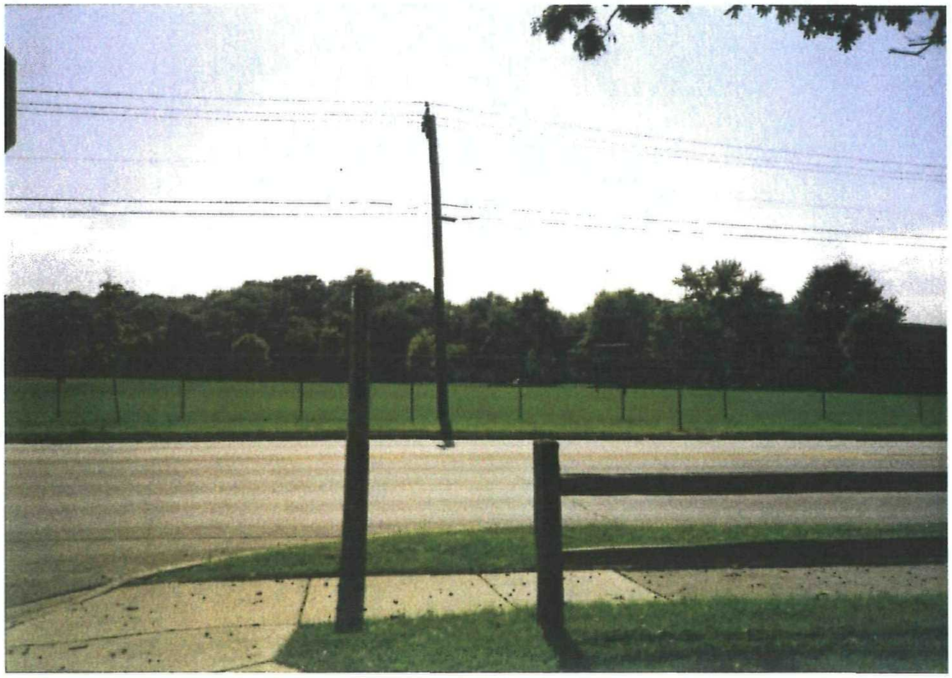
LOCATION: L0310000000

Maine Twp. H.S. South

ILD 984903237

PICTURE TAKEN TOWARD: SW

COMMENTS: Picture is taken toward NW corner of old landfill on northern most portion of property. Now athletic fields.



DATE: September 22, 1993

TIME: 3:20 p.m.

PHOTOGRAPH TAKEN BY:

Ken Corkill

PHOTO NUMBER: 7

LOCATION: L0310000000

Maine Twp. H.S. South

ILD 9849093237

PICTURE TAKEN TOWARD: S

COMMENTS: Picture taken of northern most property. Site of former landfill, now athletic fields.

DATE: September 22, 1993

TIME: 3:30 p.m.

PHOTOGRAPH TAKEN BY:

Ken Corkill

PHOTO NUMBER: 8

LOCATION: L0310000000

Maine Twp. H.S. South

ILD 984903237

PICTURE TAKEN TOWARD: SW

COMMENTS: Picture is taken toward E & SE corner of old landfill on northern portion of property. Now athletic fields.

DATE: September 22, 1993

TIME: 3:40 p.m.

PHOTOGRAPH TAKEN BY:

Ken Corkill

PHOTO NUMBER: 9

LOCATION: L0310000000

Maine Twp. H.S. South

ILD 9849093237

PICTURE TAKEN TOWARD: E

COMMENTS: Picture taken from SW corner of old landfill along southern boundary of old fill area.

DATE: September 22, 1993

TIME: 3:40 p.m.

PHOTOGRAPH TAKEN BY:

Ken Corkill

PHOTO NUMBER: 10

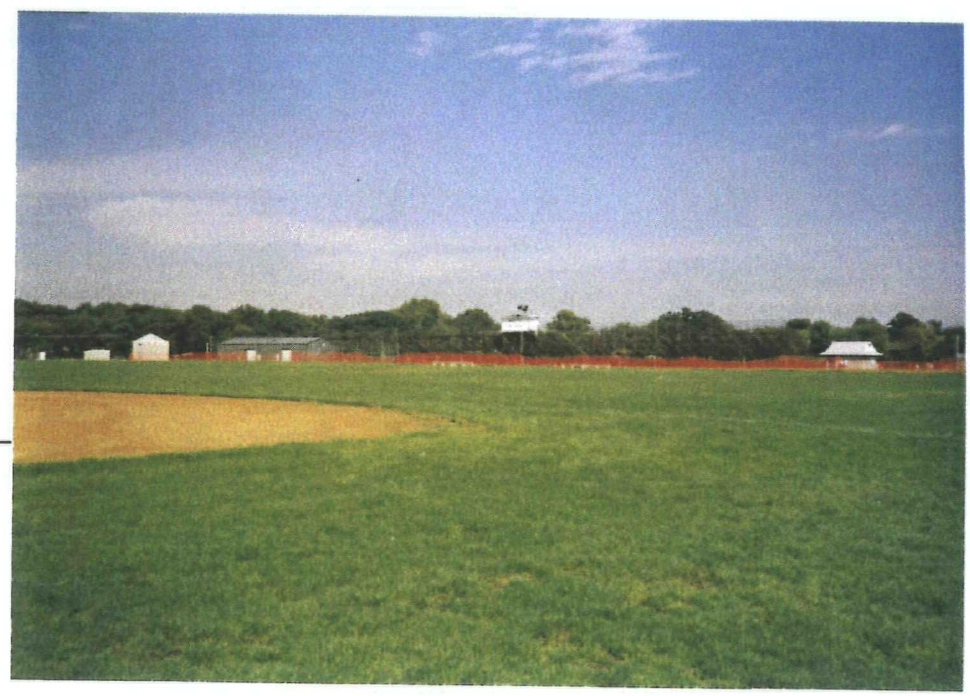
LOCATION: L0310000000

Maine Twp. H.S. South

ILD 984903237

PICTURE TAKEN TOWARD: NE

COMMENTS: Picture is taken toward center & NE corner of old landfill on northern portion of property. Now athletic fields.



DATE: September 22, 1993

TIME: 3:40 p.m.

PHOTOGRAPH TAKEN BY:

Ken Corkill

PHOTO NUMBER: 11

LOCATION: L0310000000

Maine Twp. H.S. South

ILD 9849093237

PICTURE TAKEN TOWARD: N

COMMENTS: Picture taken from SW corner of old landfill toward athletic fields.

DATE: September 22, 1993

TIME: 3:40 p.m.

PHOTOGRAPH TAKEN BY:

Ken Corkill

PHOTO NUMBER: 12

LOCATION: L0310000000

Maine Twp. H.S. South

ILD 984903237

PICTURE TAKEN TOWARD: NW

COMMENTS: Picture is taken toward NW corner of old landfill on northern portion of property. Now athletic fields.

DATE: September 22, 1993

TIME: 3:40 p.m.

PHOTOGRAPH TAKEN BY:

Ken Corkill

PHOTO NUMBER: 13

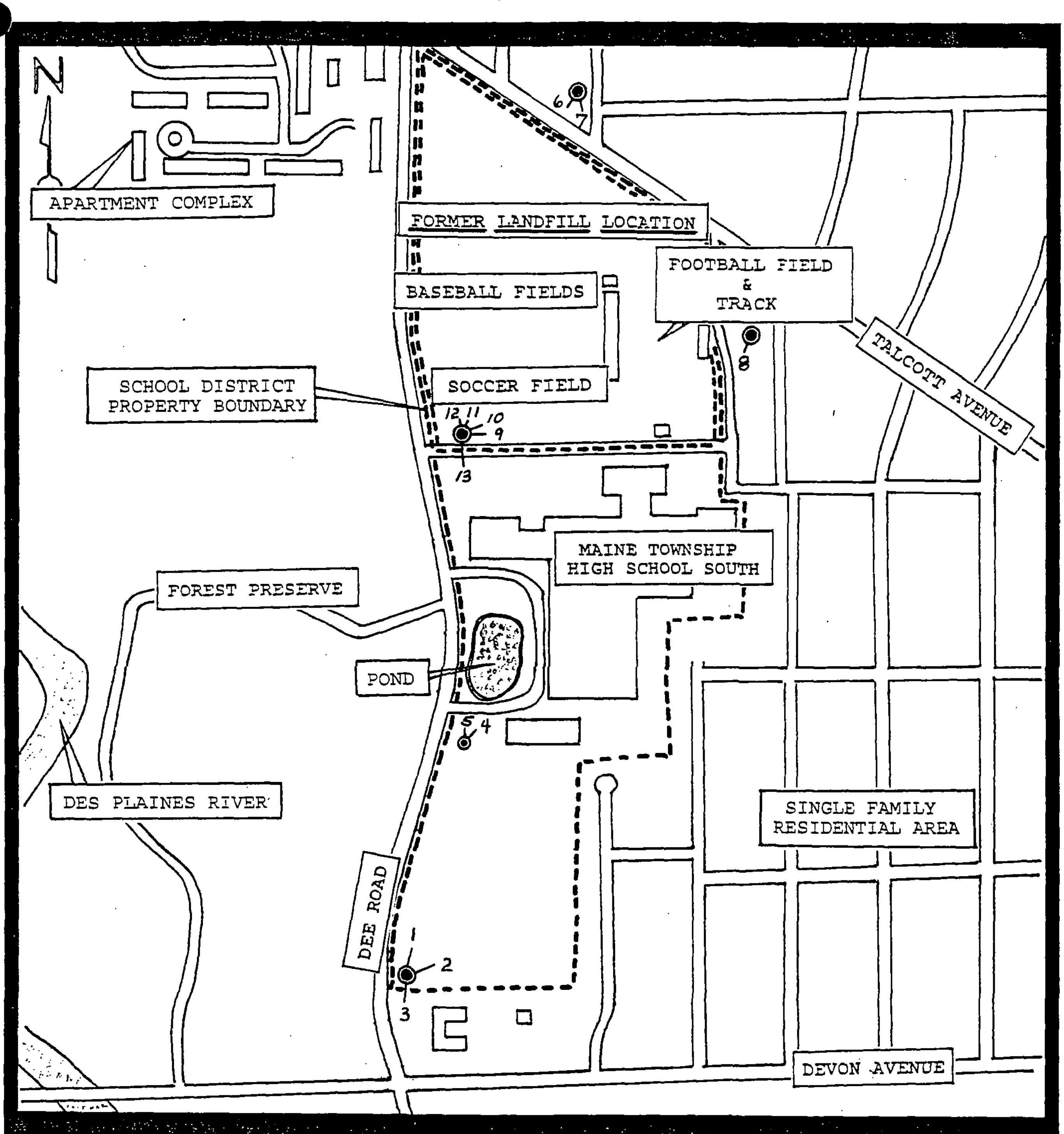
LOCATION: L0310000000

Maine Twp. H.S. South

ILD 9849093237

PICTURE TAKEN TOWARD: S

COMMENTS: Picture taken from SW corner of old landfill toward high school buildings.



SOURCE: IEPA, 1993. BASE MAP: USGS 1980, 7.5 MIN. PARK RIDGE QUAD.

PHOTO LOCATION MAP

SECTION 4

OMB Approval Number: 2050-0095
Approved for Use Through: 4/95

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION State: IL | CERCLIS Number: 984903237 CERCLIS Discovery Date: 7-20-92

1. General Site Information

Name: Maine Township High School South		Street Address: 1111 S. Dee Road			
City: Park Ridge	State: IL	Zip Code: 60068	County: Cook	Co. Code: 031	Cong. Dist: 06
Latitude: 42 0' 0.0" Longitude: 87 51' 14.0"		Approx. Area of Site: 60 acres	Status of Site: Active		

2. Owner/Operator Information

Owner: Park Ridge School District			Operator: Same		
Street Address: 315 S. Aldine			Street Address: Same		
City: Park Ridge			City: Same		
State: IL	Zip Code: 60068	Telephone:	State: IL	Zip Code: 60068	Telephone:
Type of Ownership: Municipal			How Initially Identified: Citizen Complaint		

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION
	State: IL
	CERCLIS Number: 984903237
	CERCLIS Discovery Date: 7-20-92

3. Site Evaluator Information

Name of Evaluator:	Agency/Organization:	Date Prepared:
Kenneth W. Corkill	IEPA/RPMS	7-26-93

Street Address:	City:	State:
2200 Churchill Road	Springfield	IL

Name of EPA or State Agency Contact:	Telephone:
Kenneth W. Corkill	(217) 782-6760

Street Address:	City:	State:
2200 Churchill Road	Springfield	IL

POTENTIAL HAZARDOUS

WASTE SITE

PRELIMINARY ASSESSMENT FORM

IDENTIFICATION

State:	CERCLIS Number:
IL	984903237

CERCLIS Discovery Date:
7-20-92

5. General Site Characteristics

Predominant Land Uses Within 1 Mile of Site:
- Commercial
- Residential
- Forest/Fields

Site Setting:
Suburban

Years of Operation:
Beginning Year: 1940
Ending Year: 1960

Type of Site Operations:
Municipal Landfill

Waste Generated:
Offsite

Waste Deposition Authorized By: Former Owner

Waste Accessible to the Public
No

Distance to Nearest Dwelling, School, or Workplace:
0 Feet

6. Waste Characteristics Information

Source Type	Quantity	Tier
Landfill	3.50e+01 acres	A

Tier Legend
- C = Constituent W = Wastestream
- V = Volume A = Area

General Types of Waste:
- Metals
- Organics
- Inorganics
- Solvents
- Construction/Demolition Waste
- Acids/Bases
- Oily Waste
- Municipal Waste

Physical State of Waste as Deposited
- Solid
- Liquid
- Sludge

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION State: IL | CERCLIS Number: 984903237 CERCLIS Discovery Date: 7-20-92

7. Ground Water Pathway

Is Ground Water Used for Drinking Water Within 4 Miles: No Type of Ground Water Wells Within 4 Miles: Private Depth to Shallowest Aquifer: 30 Feet Karst Terrain/Aquifer Present: No	Is There a Suspected Release to Ground Water: No Have Primary Target Drinking Water Wells Been Identified: No Nearest Designated Wellhead Protection Area: None within 4 Miles	List Secondary Target Population Served by Ground Water Withdrawn From: 0 - 1/4 Mile 20 >1/4 - 1/2 Mile 20 >1/2 - 1 Mile 10 >1 - 2 Miles 0 >2 - 3 Miles 0 >3 - 4 Miles 0 Total 50

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION	
	State: IL	CERCLIS Number: 984903237
	CERCLIS Discovery Date: 7-20-92	

8. Surface Water Pathway Part 1 of 4

Type of Surface Water Draining Site and 15 Miles Downstream:	Shortest Overland Distance From Any Source to Surface Water:
Other: Area drains, curb & gutter	0 Feet 0.0 Miles
Is there a Suspected Release to Surface Water: No	Site is Located in: >10 yr - 100 yr floodplai

`. Surface Water Pathway Part 2 of 4

Drinking Water Intakes Along the Surface Water Migration Path: Yes

Have Primary Target Drinking Water Intakes Been Identified: No

Secondary Target Drinking Water Intakes:

Name	Water Body/Flow(cfs)	Population Served
	moderate-large stream/ >100-1000	0
	Total Within 15 Miles:	0

POTENTIAL HAZARDOUS

WASTE SITE

PRELIMINARY ASSESSMENT FORM

IDENTIFICATION

State:	CERCLIS Number:
IL	984903237

CERCLIS Discovery Date: 7-20-92

8. Surface Water Pathway Part 3 of 4

Fisheries Located Along the Surface Water Migration Path: Yes

Have Primary Target Fisheries Been Identified: No

Secondary Target Fisheries:

Fishery Name	Water Body Type/Flow(cfs)
Des Plaines River	moderate-large stream/ >100-1000

8. Surface Water Pathway Part 4 of 4

Wetlands Located Along the Surface Water Migration Path? (y/n) Yes

Have Primary Target Wetlands Been Identified? (y/n) No

Secondary Target Wetlands:

Water Body/Flow(cfs)	Frontage(mi)
minimal stream/ <10	0.1 to 1

Other Sensitive Environments Along the Surface Water Migration Path: No

Have Primary Target Sensitive Environments Been Identified: No

Secondary Target Sensitive Environments:
None

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION
	State: IL | CERCLIS Number: 984903237
	CERCLIS Discovery Date: 7-20-92

9. Soil Exposure Pathway

Are People Occupying Residences or Attending School or Daycare on or Within 200 Feet of Areas of Known or Suspected Contamination: Yes
Total Resident Population: 3545

Number of Workers Onsite: None

Have Terrestrial Sensitive Environments Been Identified on or Within 200 Feet of Areas of Known or Suspected Contamination: No

10. Air Pathway

Total Population on or Within:	
Onsite	3545
0 - 1/4 Mile	2200
>1/4 - 1/2 Mile	4800
>1/2 - 1 Mile	7100
>1 - 2 Miles	27070
>2 - 3 Miles	47967
>3 - 4 Miles	76097
Total	168779

Is There a Suspected Release to Air: No

Wetlands Located Within 4 Miles of the Site: Yes

Other Sensitive Environments Located Within 4 Miles of the Site: No

Sensitive Environments Within 1/2 Mile of the Site:

Distance	Sensitive Environment Type/Wetlands Area(acres)
Onsite	Wetlands (1 to 50 acres)
>1/4 - 1/2	Wetlands (1 to 50 acres)
>1/4 - 1/2	Wetlands (1 to 50 acres)

SECTION 5

Supporting Documents

Table of Contents

STATE OF ILLINOIS
WILLIAM G. STRATTON, *Governor*
DEPARTMENT OF REGISTRATION AND EDUCATION
VERA M. BINKS, *Director*

DIVISION OF THE
STATE GEOLOGICAL SURVEY
JOHN C. FRYE, *Chief*
URBANA

CIRCULAR 198

GROUNDWATER POSSIBILITIES IN NORTHEASTERN ILLINOIS

A Preliminary Geologic Report

BY

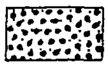
R. E. BERGSTROM, J. W. FOSTER, LIDIA F. SELKREGG, and W. A. PRYOR

Service activities concerning groundwater are performed jointly by the Illinois State Geological Survey and the Illinois State Water Survey

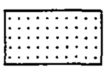
PRINTED BY AUTHORITY OF THE STATE OF ILLINOIS

URBANA, ILLINOIS
1955

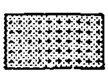
POSSIBILITIES FOR WELLS IN SAND AND GRAVEL



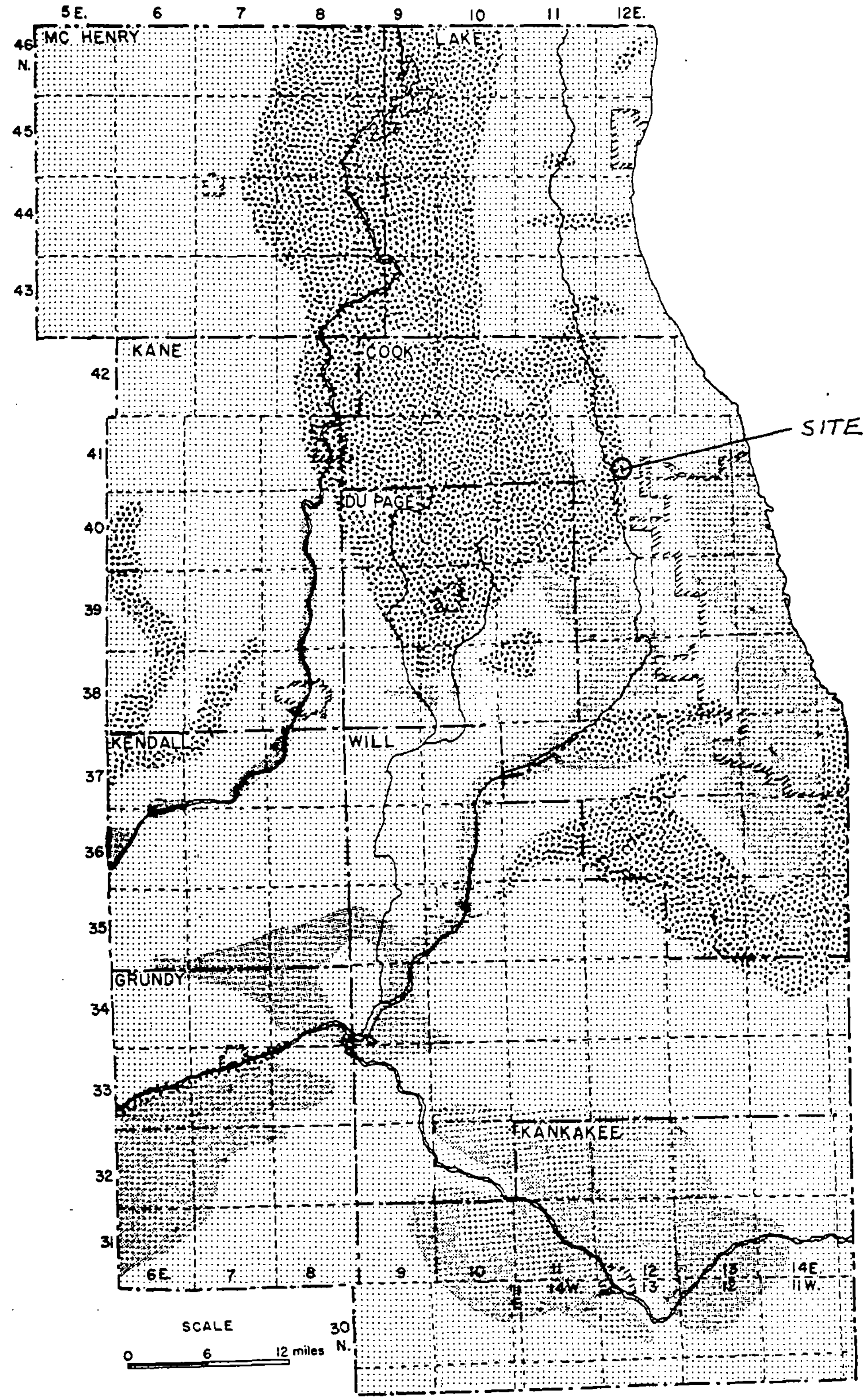
Best possibilities for the occurrence of water-bearing sand and gravel within the glacial drift. Groundwater for domestic and farm supply generally is obtainable in this area from small-diameter drilled wells completed in sand and gravel. The wells range in depth from 35 to over 200 feet, depending upon depth of water-yielding formation. Possibilities for municipal or industrial wells completed above bedrock are good to excellent, although some test drilling probably is necessary to locate the best formation and site for the construction of a high-capacity well.



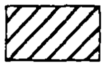
Fair to good possibilities for the occurrence of water-bearing sand and gravel within the glacial drift. Groundwater for domestic and farm supply is obtainable locally in this area from small-diameter drilled wells in sand and gravel. The wells range in depth from 35 to about 100 feet. Water-yielding sand and gravel probably is absent at many locations, so wells generally are drilled through the glacial drift into bedrock. Possibilities for municipal or industrial wells are poor to fair. Extensive test drilling is likely to be necessary to locate deposits suitable for the construction of high-capacity wells in sand and gravel. Most high-capacity wells penetrate a bedrock aquifer.



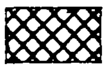
Poorest possibilities for the occurrence of water-bearing sand and gravel within the glacial drift. Most wells obtain groundwater from bedrock below the glacial drift. Depth to bedrock generally is less than 50 feet. Shallow sands along the rivers are suitable locally for domestic and farm wells, but widespread thick sand and gravel beds generally are absent.


5E.
6
7
8
9
10
11
12E.
MC HENRY
LAKE
46
N.
45
44
43
KANE
COOK
42
41
SITE
DU PAGE
40
39
38
KENDALL
WILL
37
36
35
GRUNDY
34
33
KANKAKEE
32
31
6E.
7
8
9
10
11
14W.
12
13
13
12
14E.
11W.
30
N.
SCALE
0
6
12 miles

POSSIBILITIES FOR WELLS IN UPPER BEDROCK FORMATIONS

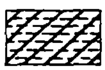


Dolomite lies directly beneath the glacial drift and yields groundwater at most locations through open crevices and channels. Most farm and domestic wells obtaining water from dolomite penetrate the rock 15 to 75 feet, depending upon the number and character of the water-yielding cracks. Industrial and municipal wells obtaining groundwater from dolomite generally penetrate 50 to 250 feet.

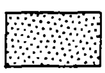


Dolomite lies directly beneath the glacial drift and generally has better-than-average water-yielding potential because of abundance of crevices and channels.

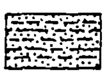
Dolomite lies directly beneath the glacial drift, but generally has less-than-average water-yielding potential.



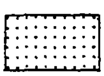
Shale or shaly dolomite bedrock is commonly found directly beneath the glacial drift. In some areas south of T. 38 N., it is necessary that wells in bedrock extend through 60 feet or more of non-water-yielding shale to penetrate water-yielding dolomite below. North of T. 37 N., particularly in Kane County, much dolomite is interbedded with the shale and may yield groundwater from open cracks.



Water-yielding St. Peter sandstone lies directly beneath the glacial drift and is suitable for small-diameter drilled wells.

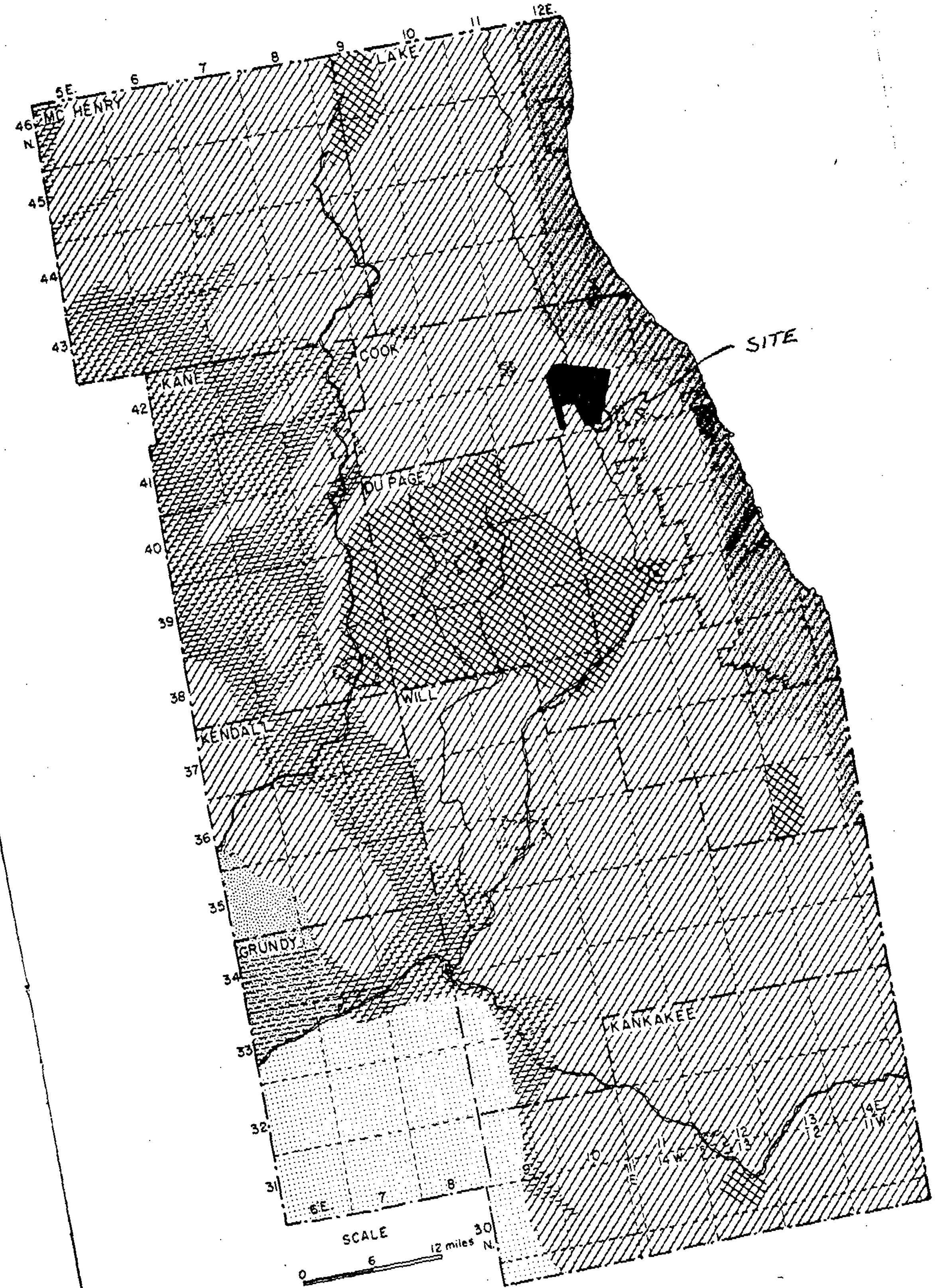


Shale bedrock, generally 35 to 100 feet thick, lies directly beneath the glacial drift. Most drilled wells penetrate through non-water-yielding shale into water-bearing sandstone below.



Pennsylvanian ("Coal Measures") bedrock lies directly beneath the glacial drift. The formations are mostly non-water-yielding shales, but sandstone beds occur locally (as around Verona, Carbon Hill, Braceville, Gardner, and South Wilmington) and are suitable for domestic and farm wells. Conditions in these rocks generally are unfavorable for high-capacity wells.

Des Plaines faulted area. Bedrock formations are broken and displaced, so the usual sequence of formations rarely is found. Upper bedrock generally consists of tight shale more than 400 feet thick in some places. There are possibilities of high-capacity wells in deep sandstone, but shallow sand and gravel should be investigated first.



SITE
MC HENRY
LAKE
COOK
KANE
DU PAGE
WILL
KENDALL
GRUNDY
KANKAKEE
5E.
6
7
8
9
10
11
12E.
46
N.
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44
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31
30
N.
6E.
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8
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10
11
E.
11
14 W.
12
13
13
12
14E.
11 W.
SCALE
0
6
12 miles

COOK COUNTY

Groundwater possibilities in sand and gravel beds in Cook County are best in the upland areas in the northwestern, south-central, and southern parts of the county. These water-yielding deposits are principally sand and fine to coarse gravel, which are in some places as much as 100 feet thick. They occur mainly in the lower half of the glacial drift. Best possibilities for industrial and municipal supplies of water in sand and gravel are near Elgin, Bartlett, Arlington Heights, and Orland Park; also locally elsewhere.

In central Cook County and along the Des Plaines River southwest of Summit, the glacial drift is thin and sand and gravel deposits are correspondingly thin or are absent. Here shallow sand deposits are mainly fine-grained or silty, and virtually all drilled wells penetrate solid bedrock for groundwater supplies.

The Chicago Plain lies generally east of Homewood, Oak Forest, Evergreen Park, Justice, LaGrange, Bellwood, Niles, and Northfield. This lowland is underlain by silts and clays deposited on the floor of ancient Lake Chicago. Water-bearing sands are extremely scarce in the lake beds. The surface of the Chicago Plain is marked with more-or-less continuous ancient beach ridges and spits of clean sand, for example, the Glenwood Beach running southeastward from Glenwood and the Wilmette spit fanning south-southwestward from Wilmette. The sands of these features are generally too thin to be suitable for water wells, but locally the sands extend to depths of 25 to 30 feet and are water-bearing in the lower part. A narrow band of beach sand along the present Lake Michigan shore yields groundwater to sand-point wells in scattered places.

The common source of groundwater for domestic wells in Cook County is in the upper part of the dolomitic bedrock, lying immediately below the drift. Beneath the silts and clays of the Chicago Plain in the eastern part of Cook County, the dolomitic bedrock is relatively tight and locally not water-yielding. Areas where the shallow dolomite is particularly favorable for water wells are in the western half of T. 35 N., R. 14 E., near Chicago Heights, and in parts of Ts. 38 and 39 N., R. 12 E., near LaGrange.

Cook County is underlain by deeply buried sandstone, a reliable source of municipal and industrial water supplies. The Galesville sandstone ranges in depth from 1000 feet in northwestern Cook County to 1800 feet in the extreme southeastern part. Most municipal and major industrial water supplies in the county are obtained from this aquifer.

In north-central Cook County, in the vicinity of Des Plaines, bedrock formations have been severely broken and displaced, or faulted (fig. 3). Uncommonly great thicknesses of shale are encountered locally within the Des Plaines faulted area, and dolomite formations may be thin or absent. Groundwater possibilities in dolomite are therefore poorer here than they are in most of Cook County.

DUPAGE COUNTY

Thick glacial drift containing water-yielding sand and gravel deposits overlies the dolomite in DuPage County. The most favorable areas for sand and

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BULLETIN 60-32
STATE OF ILLINOIS
DEPARTMENT OF ENERGY AND NATURAL RESOURCES

Public Ground-Water Supplies in DuPage County

by DOROTHY M. WOLLER, ELLIS W. SANDERSON and MICHAEL L. SARGENT

ILLINOIS STATE WATER SURVEY
CHAMPAIGN
1986

PUBLIC GROUND-WATER SUPPLIES IN DU PAGE COUNTY

by Dorothy M. Woller, Ellis W. Sanderson, and Michael L. Sargent

Introduction

This publication presents all available information on production wells used for public water supplies in Du Page County. Bulletin 60, which is divided into separate publications by county, supersedes Bulletin 40 and its Supplements 1 and 2.

This report includes separate descriptions for 65 public water supplies in Du Page County. These are preceded by brief summaries of the ground-water geology of the county and the development of ground-water sources for public use. An explanation of the format used in the descriptions is also given.

Acknowledgments. This report was prepared under the general direction of Stanley A. Changnon, Jr., Chief of the Illinois State Water Survey, and James P. Gibb, Head of the Ground Water Section. Special thanks are given to R. T. Sasman, Hydrologist, who checked all of the data and reviewed the manuscript. John W. Brother, Jr., supervised the preparation of the illustrations, and James R. Kirk assisted in the final preparation of the manuscript. The chemical analyses, unless otherwise stated, were made by personnel of the Water Survey Analytical Chemistry Laboratory Unit under the supervision of James C. Whitney. The analyses made by personnel of the Illinois Environmental Protection Agency were under the supervision of Roger Selburg. Ross D. Brower, Associate Geologist, Illinois State Geological Survey, reviewed the geological information in the manuscript. Grateful acknowledgment also is given to consulting engineers, well drillers, water superintendents, and municipal officials who have provided valuable information used in this report.

Ground-water Geology

The geology of Du Page County is described in Illinois State Geological Survey Circular 198, "Ground-water Possibilities in Northeastern Illinois"; Circular 406, "Bedrock Aquifers of Northeastern Illinois"; Circular 460, "Summary of the Geology of the Chicago Area"; and Report of Investigation 218, "Cambrian and Ordovician Strata of Northeastern Illinois"; and in Illinois State Water Survey and State Geological Survey Cooperative Ground-Water Report 1, "Preliminary Report on Ground-Water Resources of the Chicago Region, Illinois," and Cooperative Ground-Water Report 2, "Ground-Water Resources of Du Page County, Illinois." The following brief discussion of geologic conditions in the county is taken largely from these publications. More detailed information on the geology in this portion of the state can be obtained from the State Geological Survey, which is located on the campus of the University of Illinois at Urbana-Champaign.

The glacial drift deposits of the Prairie Aquigroup in Du Page County generally range in thickness from 50 to 150 ft in most of the county and reach 180 ft in a buried bedrock valley in the north central area in T40N, R10E, and in other scattered sites. Sand and gravel deposits offering possibilities for the development of moderate quantities of water (50 to 200 gpm) from individual wells are present within the glacial drift in more than half of the county.

Beneath the glacial deposits, the upper bedrock formations consist principally of dolomite (a limestone-like rock) and minor amounts of shale that dip easterly at about 10 ft per mile. Rock formations underlying Du Page County range in age from Silurian to Precambrian (see generalized stratigraphic sequence in figure 1).

Dolomites of the Silurian System underlie the glacial drift throughout almost the entire county. This unit is part of the geohydrologic system present throughout northeastern Illinois that is referred to as the shallow Upper Bedrock Aquigroup. These rocks are encountered by wells beneath the drift about 25 to 200 ft below the surface. They range in thickness from about 50 to 175 ft in most of the county but reach a thickness of 225 ft along the eastern edge. In the north central area, there is a narrow east-west band in which erosion has exposed the underlying Maquoketa Group. The yield capability of the Silurian depends primarily upon the number, size, and degree of interconnection of water-filled cracks and crevices in the rocks that are penetrated by a well bore. In some areas the Silurian rocks directly underlie permeable deposits of water-bearing sand and gravel. Under such geohydrologic conditions, the presence of solution cracks and crevices and free exchange of water from the glacial drift to the bedrock are enhanced, thereby increasing the yield capability of the Upper Bedrock Aquigroup.

The Maquoketa Group (Ordovician age) underlies the Silurian System throughout Du Page County, except for a narrow band in T40N, R10E, and consists primarily of shales that yield little or no water and that separate the Silurian from deeper water-bearing units. These shales lie at depths from about 150 ft in areas in the northwestern part of the county to more than 250 ft in the eastern part of the county. The Maquoketa ranges from about 140 to 235 ft thick from south to north across the county. The Maquoketa Group generally is not considered as a source for large water supplies. Locally, supplies adequate for small subdivisions and domestic use are obtained from systems of cracks and crevices in the more dolomitic parts of this group, which average at least 50 ft thick.

Below the Maquoketa Group occurs a thick succession of hydrologically connected rocks that are referred to as the Midwest Aquigroup (Cambrian-Ordovician aquifer system) in Du Page County. This aquigroup consists in downward order of the Galena and Platteville Dolomite Groups, Glenwood-St. Peter Sandstone, Prairie du Chien Group, Eminence-Potosi Dolomite, Franconia Formation, and Ironton-Galesville Sandstone.

Dolomite of the Galena and Platteville Groups (Ordovician age) lies at depths of about 350 ft in the western areas of the county to about 450 ft in the eastern regions. It is relatively uniform in thickness throughout the county, ranging from about 300 to 355 ft. Water from this aquifer is obtained from cracks and crevices so that the yield of an individual well depends primarily upon the number, size, and degree of interconnection of the crevices intersected by a well bore.

The Glenwood-St. Peter Sandstone (Ordovician age) lies below the Galena-Platteville. This sandstone aquifer is encountered at depths from about 650 ft along the west edge of the county to approximately 800 ft near the east border. It ranges from about 200 to 300 ft thick in the south part of the county to more than 300 ft in the north and is 400 ft thick in small areas east and west of Wheaton. Its total range in thickness is from about 95 to 445 ft. It is estimated that the Galena-Platteville and the Glenwood-St. Peter produce about 15 percent of the total potential yield from the Midwest Aquigroup.

Below the Glenwood-St. Peter lie the Prairie du Chien Group (Ordovician age), the Eminence-Potosi Dolomite (Cambrian age), and the Franconia Formation that consists of interbedded sandstones, shales, and dolomites. These units are encountered at depths ranging from about 850 ft in the southwest to about 1150 ft in the northeast and have total thicknesses varying from about 50 to 400 ft. The shales and dolomites yield small quantities of water, but the sandy parts of these formations may contribute moderate quantities of water to wells where they are not cased off by liners. It is estimated that these formations produce about 35 percent of the total yield from the Midwest Aquigroup. Wells tapping only these strata are seldom constructed.

The Ironton-Galesville Sandstone (Cambrian age) is the most consistently permeable and productive unit of the Midwest Aquigroup in northeastern Illinois. It is usually about 175 to 200 ft thick in Du Page County and lies at a depth of about 1100 ft in the northwest corner to about 1300 ft at Wheaton to about 1450 ft in the southeast corner along the Des Plaines River. It is estimated that this unit produces about 50 percent of the total yield of the Midwest Aquigroup.

Below the Ironton-Galesville Sandstone lies the Eau Claire Formation. The upper and middle parts of the

SYSTEM	SERIES	GROUP OR FORMATION	AQUIGROUP	LOG	THICKNESS (FT)	DESCRIPTION
QUATERNARY	PLEISTOCENE		Prairie Aquigroup		0-180	Unconsolidated glacial deposits-pebbly clay (till), silt, sand and gravel Alluvial silts and sands along streams
SILURIAN	NIAGARAN	Racine	Upper Bedrock Aquigroup	reef	0-150	Dolomite, very pure to argillaceous, silty, cherty; reefs in upper part
		Sugar Run				Dolomite, slightly argillaceous and silty
		Joliet				Dolomite, very pure to shaly and shale, dolomitic; white, light gray, green, pink, maroon
	ALEXANDRIAN	Kankakee			0-80	Dolomite, pure top 1'-2', thin green shale partings, base glauconitic
		Elwood				Dolomite, slightly argillaceous, abundant layered white chert
		Wilhelmi				Dolomite, gray, argillaceous and becomes dolomitic shale at base
ORDOVICIAN	CINCINNATIAN	Maquoketa	Midwest Aquigroup		125-235	Shale, red to maroon, oolites Shale, silty, dolomitic, greenish gray, weak (Upper unit) Dolomite and limestone, white, light gray, interbedded shale (Middle unit) Shale, dolomitic, brown, gray (Lower unit)
	CHAMPLAINIAN	Galena			300-355	Dolomite, and/or limestone, cherty (Lower part)
		Platteville				Dolomite, shale partings, speckled Dolomite and/or limestone, cherty, sandy at base
		Glenwood			95-445	Sandstone, fine and coarse grained; little dolomite; shale at top
		St. Peter				Sandstone, fine to medium grained; locally cherty red shale at base
	CANADIAN	Shakopee			0-210	Dolomite, sandy, cherty (oolitic); sandstone
		New Richmond				Sandstone interbedded with dolomite
		Oneota				Dolomite, white to pink, coarse grained cherty (oolitic)
		Gunter				Sandstone, medium-grained, slightly dolomitic
CAMBRIAN	CROIXAN	Eminence			0-190	Dolomite, light colored, sandy, thin sandstones
		Potosi				Dolomite, fine-grained, gray to brown, drusy quartz
		Franconia			50-110	Dolomite, sandstone and shale, glauconitic, green to red, micaceous
		Ironton			130-205	Sandstone, fine to coarse grained, well sorted; upper part dolomitic
		Galesville				
		Eau Claire	Basal Bedrock Aquigroup		245-375	Shale and siltstone, dolomitic, glauconitic; sandstone, dolomitic, glauconitic
		Elmhurst Member				
		Mt. Simon			2100-2500	Sandstone, coarse grained, white, red in lower half; lenses of shale and siltstone, red, micaceous
PRE-CAMBRIAN						Granitic rocks

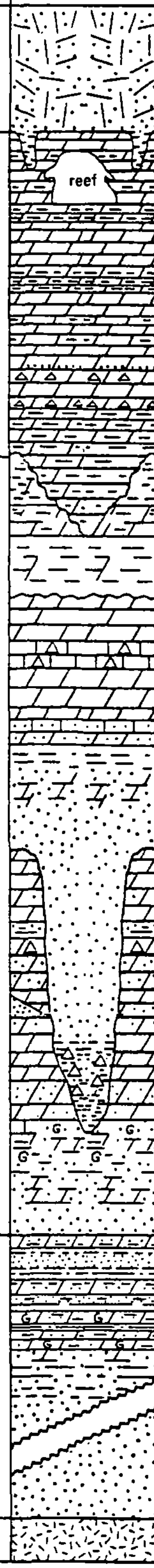


Figure 1. Generalized column of rock stratigraphic units and aquigroups in DuPage County

Eau Claire are composed primarily of shales, siltstones, and dolomite that yield almost no water and that separate the Midwest Aquigroup from deeper water-bearing units. The Elmhurst Sandstone Member at the base of the Eau Claire Formation and the underlying Mt. Simon Sandstone are hydrologically connected and form the Basal Bedrock Aquigroup, the deepest fresh-water aquifer in northern Illinois. In Du Page County this aquifer lies at depths ranging from about 1700 ft in the northwest to more than 1900 ft in the southeast and ranges in thickness from about 2100 ft in the northwest part to about 2500 ft in the southern part of the county. Water wells usually penetrate only a few hundred feet into this aquifer because the quality of the water deteriorates with depth. Water obtained below an elevation of about 1300 ft below sea level is generally too highly mineralized for use.

Ground-water Development For Public Use

Ground water is used as a source for 65 public water supplies in Du Page County. The locations of these supplies are shown in figure 2.

Sand and gravel deposits in the unconsolidated materials of the Prairie Aquigroup above bedrock are tapped by 5 public water supply systems in Du Page County as a partial source of their water supply. There are presently 6 production and standby wells, ranging in depth from 61 to 136 ft, tapping only the sand and gravel deposits. Their reported pumping rates range from 20 to 750 gpm depending primarily upon the type of well and the permeability, thickness, and areal extent of the sand and gravel unit tapped by each well. Production from these wells for 1984 was estimated to be about 1,130,000 gpd.

The analyses of water from these wells show that the iron content generally ranges from 0.0 to 2.7 mg/l, sulfates from 38 to 410 mg/l, hardness from 292 to 696 mg/l, and total dissolved minerals from 396 to 970 mg/l. Treatment provided for these supplies is as follows: 5 chlorinate, 5 fluoridate, 1 softens, and 3 add polyphosphate to keep iron in solution.

The upper bedrock units in Du Page County, the Upper Bedrock Aquigroup (Silurian dolomite and the Maquoketa Group), are tapped by 59 public water systems as a source of all or a portion of their water supply. There are presently 176 production and standby wells finished in these units (including 4 wells at Addison, 1 well at Roselle, and 1 well at Wheaton which also tap overlying sand and gravel deposits). They range in depth from 75 to 425 ft and are pumped at rates of about 20 to 2500 gpm. The yield of an individual well depends primarily on the thickness of the aquifer and the number, size, and degree of interconnection of the crevices intersected by the well bore. Withdrawals from the upper bedrock units for 1984 were estimated to be about 45,759,000 gpd.

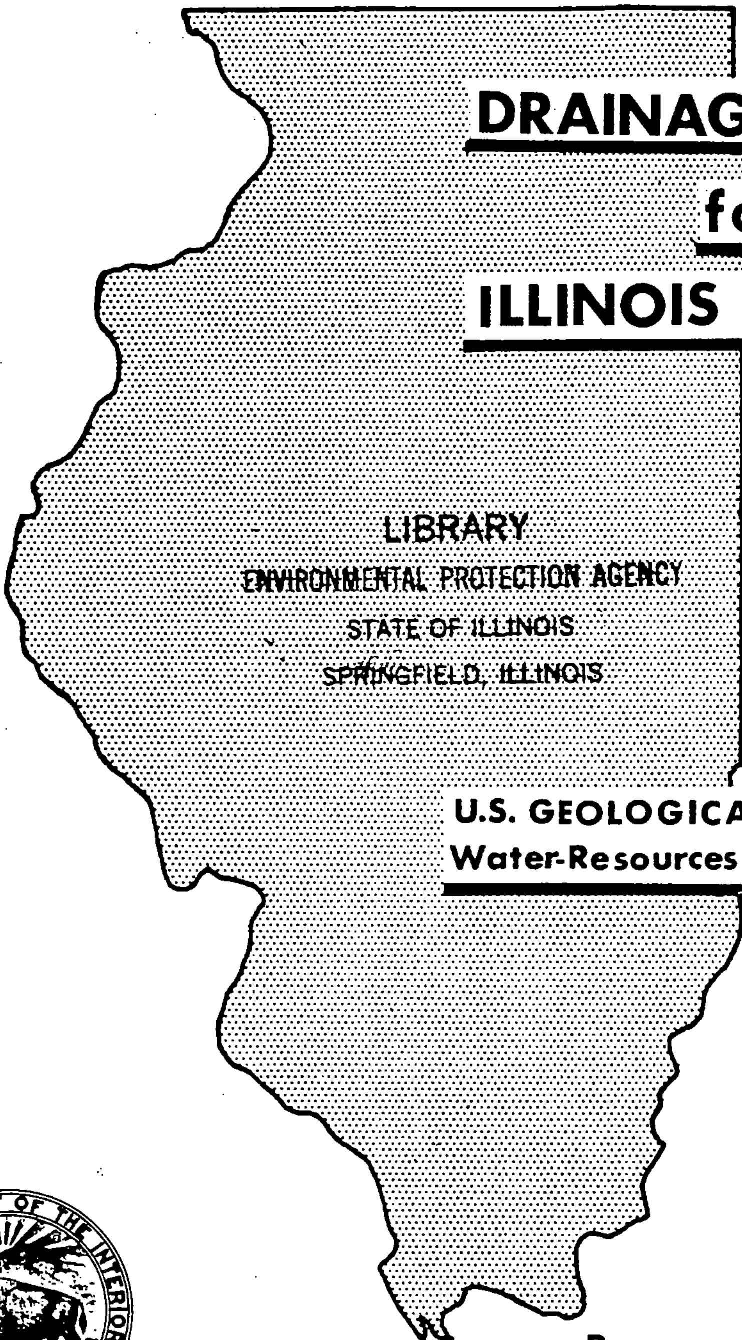
Analyses of water from these wells show that the iron content usually ranges from 0.0 to 5.8 mg/l, sulfates from 34 to 530 mg/l, hardness from 16 to 945 mg/l, and total dissolved minerals from 357 to 1252 mg/l. The chloride content of water from 1 well exceeds the recommended limit of 250 mg/l. Hydrogen sulfide gas was also noted in water from 5 wells. Treatment provided at the 59 supply systems is as follows: 56 chlorinate, 47 fluoridate, 26 add polyphosphate to keep iron in solution, 9 soften, 5 aerate, 3 treat with silicate, 2 filter, 2 treat for iron removal, and 2 provide no treatment.

Wells tapping combinations of formations within the Midwest Aquigroup (Cambrian-Ordovician aquifer system) are used by 19 public water systems as a source for a portion of their water supply. There are presently 45 production wells, ranging in depth from 1356 to 1630 ft, finished within the Midwest Aquigroup. These wells are pumped at rates of about 500 to 1350 gpm. Production from these wells for 1984 was estimated to be about 28,035,000 gpd.

The analyses of water from these wells show that the iron content usually ranges from 0.0 to 1.9 mg/l, fluoride from 0.1 to 3.8 mg/l, sulfates from 6 to 436.7 mg/l, hardness from 188 to 638 mg/l, and total dissolved minerals from 290 to 755 mg/l. The barium content of water from these wells ranges from 0.0 to 4.9 mg/l. Hydrogen sulfide gas was also noted in water from 5 wells. Water treatment for these supplies is as follows: 19 chlorinate, 9 fluoride, 3 soften, 3 aerate, 1 treats for iron removal, 1 filters, and 10 add polyphosphate to keep iron in solution.

Throughout most of northeastern Illinois the Midwest Aquigroup (Cambrian-Ordovician aquifer system) has been overdeveloped, resulting in marked declines in water levels of this aquifer. In Du Page County water levels have declined at an average rate of about 13 ft per year for the period 1971 to 1975 and about 12 ft per year for the period 1975 to 1980.

Wells tapping combinations of formations within the Midwest and Basal Bedrock Aquigroups (Cambrian-Ordovician and the Elmhurst-Mt. Simon



DRAINAGE AREAS for ILLINOIS STREAMS

U.S. GEOLOGICAL SURVEY
Water-Resources Investigations 13-75

Prepared in cooperation with
ILLINOIS INSTITUTE FOR
ENVIRONMENTAL QUALITY

05528400	Des Plaines River at Ill. Highway 68 at Wheeling	SW 1	42 N	11 E	Wheeling	Cook	CSG	325
05528440	Buffalo Creek near Lake Zurich	NE 27	43 N	10 E	Lake Zurich	Lake	CSG	1.03
05528470	Buffalo Creek at Long Grove	NW 30	43 N	11 E	Wheeling	Lake	CSG	7.88
05528500	Buffalo Creek at Ill. Highway 83 near Wheeling	NW 4	42 N	11 E	Wheeling	Cook	GS	19.6
05528530	Wheeling Drainage ditch (continuation of Buffalo Creek) at Ill. Highway 68 at Wheeling	SW 2	42 N	11 E	Wheeling	Cook	CSG	21.8
	Wheeling Drainage ditch at U. S. Highway 45 at mouth near Wheeling	SE 13	42 N	11 E	Arlington Hts.	Cook	DA	27.0
05529000	Des Plaines River near Des Plaines	SE 25	42 N	11 E	Arlington Hts.	Cook	GS	360
05529300	McDonald Creek near Wheeling	NW 15	42 N	11 E	Arlington Hts.	Cook	CSG	4.58
05529500	McDonald Creek near Mount Prospect	NE 26	42 N	11 E	Arlington Hts.	Cook	GS	7.93
	McDonald Creek at mouth near Mount Prospect	NE 36	42 N	11 E	Arlington Hts.	Cook	DA	10.3
05529900	Weller Creek at Mount Prospect	SW 11	41 N	11 E	Arlington Hts.	Cook	CSG	9.02
05530000	Weller Creek at Ill. Highway 58 at Des Plaines	NW 18	41 N	12 E	Arlington Hts.	Cook	GS	13.2
	Weller Creek at mouth at Des Plaines	SW 16	41 N	12 E	Arlington Hts.	Cook	DA	16.6
05530200	Des Plaines River at Park Ridge	NW 34	41 N	12 E	Park Ridge	Cook	CSG	409
05530300	Willow Creek at Elk Grove Village	NW 2	40 N	11 E	Elmhurst	Du Page	CSG	2.39
05530400	Higgins Creek at Ill. Highway 83 near Mount Prospect	NW 23	41 N	11 E	Arlington Hts.	Cook	CSG	2.24
	Higgins Creek at mouth near Rosemont	NW 31	41 N	12 E	Arlington Hts.	Cook	DA	7.31
05530460	Willow Creek at Ill. Highway 72 near Des Plaines	NE 31	41 N	12 E	Arlington Hts.	Cook	CSG	17.0
05530480	Willow Creek at Ill. Highway 72 at Orchard Place	SW 33	41 N	12 E	Elmhurst	Cook	CSG	18.1
05530500	Willow Creek near Park Ridge	NE 4	40 N	12 E	River Forest	Cook	GS	19.7
	Willow Creek at mouth near Rosemont	SE 3	40 N	12 E	River Forest	Cook	DA	20.1
05530550	Crystal Creek at U. S. Highway 12 near Schiller Park	NW 16	40 N	12 E	Elmhurst	Cook	CSG	3.26
05530570	Crystal Creek at Schiller Park	NW 15	40 N	12 E	River Forest	Cook	CSG	5.16
	Crystal Creek at mouth near Schiller Park	NW 15	40 N	12 E	River Forest	Cook	DA	5.27
05530600	Des Plaines River at River Grove	SW 26	40 N	12 E	River Forest	Cook	CSG	451
05530640	Bensenville ditch at Ill. Highway 19 near Bensenville	SW 18	40 N	12 E	Elmhurst	Cook	CSG	3.96

HAZARDOUS WASTE RESEARCH AND INFORMATION CENTER
1808 Woodfield Drive
Savoy, Illinois 61874
217/333-8940

RECEIVED
MAR 22 1989
IEPA-DLPC

March 17, 1989

George Katerinis
8408 West Normal
Niles, IL 60648

Dear George:

I am writing in response to your inquiry regarding possible health hazards at Maine Township High School South. Since the site is known to contain buried wastes, and given the health concerns that were expressed in your letter, there is a possibility that the state could nominate the site for inclusion on the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) list. The U.S. Environmental Protection Agency maintains the list as part of their program devoted to cleanup of uncontrolled or abandoned hazardous waste sites. The basis of the program is federal legislation: the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, and amendments thereto: the Superfund Amendments and Reauthorization Act (SARA) of 1986. You may have heard of the program more commonly as "Superfund". Once a suspected contamination site is listed, a process of evaluating the site for potential threats to public health and the environment is initiated. If sufficient evidence of a health or environmental threat is found, the site becomes eligible for cleanup of contaminants under the federal Superfund program, or under a similar state program known as "Clean Illinois". Of course, even if cleanup is not warranted, the evaluation of contamination potential is a desirable outcome of listing the site on CERCLIS.

I have made appropriate state agency personnel aware of your concerns regarding the former landfill at your school. The issue of listing the site on CERCLIS was discussed and is pending.

I hope you find this information useful. It is commendable that you have taken the initiative to have these issues addressed. Some of your classmates should have received a response from Thomas Long of the Illinois Department of Public Health. You should take note of his assessment of the site if you haven't already done so.

Sincerely,

Lance Perry

Lance G. Perry
Data Management Specialist

xc: David Thomas, Director,
Gary Miller, Asst. Director
Thomas Long, IDPH, Monte Nienkerk, IEPA

...ous Waste Research + Information Center
...8 Woodfield Road
Savoy, IL 61874

Julie Caccavella
239 N. Delphia
Park Ridge, IL 6006

Jan. 24, 1989

To whom it may concern,

I am a concerned student attending Maine South Highschool. I have been informed that the school has been built directly on top of a landfill 25 years ago. Within thoes 25 years, about 4 people working for the school have aquired cancer. All of these 4 people were coaches of some type of field sport. Have there ever been any tests conducted on the area being occupied by Maine South Highschool? If so when + what were the resuets. Also, is it possible for the wastes of that landfill to seep into the ground water and eventually pollute the drinking water of Park Ridge and the surrounding suburbs?

Sincerly,
Julie Caccavella

March 1, 1989

Carmen Salerno
317 N. Aldine
Park Ridge, IL 60068

Dear Ms. Salerno:

Thank you for your recent letter outlining your concerns about your school and the environment. It is laudable that you have taken the time and interest to ask such questions. A number of other students at Maine South have also written similar letters and the issues identified are as follows:

1) Is Main South situated upon a landfill?

This is apparently true. Of the sixty-odd acres comprising the school's property, approximately 55% was landfilled over the course of several years and ending in the mid to late 1960's. About 25% of the school building itself sits atop landfilled areas.

2) What went into the landfill?

This landfill opened, operated and closed before strict regulations on record-keeping or limitations on disposal practices were in place. It is our assumption that this landfill accepted largely municipal and household wastes, however, the actual type and amount of waste is unknown. Disposal of industrial wastes in this landfill is, therefore, possible. Additionally, some types of waste commonly disposed in household or municipal trash may also be classified as hazardous. Therefore, I would conclude that materials were disposed in this landfill over twenty years ago which would be considered potentially hazardous if released into the environment. The DuPage County Health Department or other local governmental bodies may have more complete records on this landfill's operation than are available to our agency. Alternatively, I understand that this landfill was operated by an independent business concern. If still in existence, they may have records relating to disposal practices at this site.

3) What tests have been done at this site?

There are no tests on record relating to this site. Presently permitted landfills are required to be evaluated for their impacts on the environment, geology, and hydrology; they must be lined with synthetic or clay barriers; install and regularly test monitoring wells around the site; may only accept permitted wastes and must keep records on what they accept; and when closed, a specially engineered cap must be installed and maintained. Again this site closed long before landfills became an environmental issue. According to school authorities, the only environmental testing conducted at Maine South has been that for asbestos.

4) Are hazardous substances escaping from the landfill?

This is a possibility, but it is not known with any certainty if this is occurring or to what degree. There are, however, no reports of observable leachate, odors, surface contamination, or physical indications that the landfill's integrity has been markedly compromised. The landfill does have a functional cap over it as the result of closure activities as well as attempts on the part of school authorities to level off areas of subsidence. Depending on the thickness and construction of the cover, this would act to limit the movement and release of volatile products and trapped gases. Additionally, the part of the school that is built over the landfill is reportedly equipped with vents, installed to prevent a possible methane build-up. This system would presumably act to disperse other landfill constituents penetrating the cap before they could enter the building. It is impossible to assess the subsurface environment due to lack of pertinent data (soil samples, waste characterization, groundwater samples, etc.) or mechanisms for collecting such information (monitoring wells, etc.). Based on this and similar situations, there is almost certainly some subsurface contamination; however, it seems unlikely that any significant human exposure is presently occurring at this site based on currently available data. If leachate is visible on the surface, odors are apparent, or some other aspect of visible environmental degradation is present, please inform us.

5) Should testing be done?

At present, there is nothing to indicate the need for testing. Testing for environmental contamination is quite costly and complex, and most effort is directed toward known or highly suspect areas of contamination. Another question that arises in the same context is what type of testing is appropriate/possible? There are hundreds of different chemicals and chemical combinations requiring different sampling and analytical procedures. Before complex and difficult analyses are undertaken, the need would have to be demonstrated and sufficient background information generated to allow decisions to be made as to subsequent and appropriate testing.

6) Is the water supply safe?

Maine South is connected to the local public water supply. Whatever subsurface contamination might exist will not affect the school's water supply.

7) Is there a link between the landfill and the cancer occurrence in some faculty members.

Cancer is the second leading cause of death in this country and approximately one of three people will develop cancer in their lifetimes. It should be made clear, however, that cancer is actually many diseases, many with different causes and outlooks. In many respects, cancer can be defined as a disease of age and lifestyle since its frequency increases with age and lifestyle choices. For instance, lung cancer is associated with smoking and it takes decades to develop, breast cancer predominates in women and is strongly associated with hormonal status and weakly associated with exposure to sunlight; and dietary habits are associated with colon and stomach cancer. In fact, 75-80% of all cancers are associated with diet, smoking, alcohol consumption, or genetic factors. Only 5-10% of cancers are assumed to have an occupational/environmental cause. The regrettable fact that five of your faculty developed a cancer is certainly of concern, but I view it as unlikely that they have a cause rooted in their possible exposure to constituents associated with the landfill. The cancers are referred to as "different" which weakens the case for their having similar causes (additionally, we would need to confirm that cancer was actually diagnosed in these individuals). There is also no information given as the the actual tumor types, the time frame of cases, the age of the victims, whether they smoked or not, hobbies, past occupations and other associated confounding factors. What you have reported is a clustering of cases which seems significant because of the number and proximity of the individuals to one another. This is, however, an artificial situation since the individuals are together based on their jobs. The actual time spent in the area of concern is probably small compared to the time spent off the field, as well as away from the school. This in conjunction with the lack of any known exposure to any landfill constituents in general and any potential carcinogens in particular make the link between the two observations very tenuous.

8) Is the school and associated environment dangerous?

It is almost certainly the case that no imminent danger to human health or welfare exists at this site (or school). While low-level exposure to potentially hazardous materials is possible, I view this possibility as remote for reasons outlined above. I would, therefore, conclude that no acute or chronic health hazards exist at your school based on the data available for our review. I hope this answers some of your questions and concerns. If further information is desired, we can arrange to have a representative of this Department meet with you and your fellow students at some future date.

Sincerely,

Thomas F. Long

Thomas F. Long
Senior Toxicologist
Environmental Toxicology Program

cc: Division of Environmental Health, Region 7
IEPA, Maywood
Lance Perry, HWRIC

SR:roh/8733 & 8734B

460

STATE OF ILLINOIS
DEPARTMENT OF REGISTRATION AND EDUCATION

SUMMARY OF THE GEOLOGY OF THE CHICAGO AREA

H. B. Willman

CIRCULAR 460 1971

ILLINOIS STATE GEOLOGICAL SURVEY
URBANA, ILLINOIS 61801
John C. Frye, *Chief*

feet in the northern part to 220 feet in the southern (Buschbach, 1964, pl. 4). Local areas of thinning result from pre-St. Peter erosion.

Eminence Formation - The Eminence Formation consists of light colored sandy dolomite. A thin bed of sandstone at the base generally separates it from the non-sandy Potosi Dolomite. The dolomite contains oolitic chert and thin beds of sandstone. It is generally absent in the northern part of the region because of pre-St. Peter erosion. In the area where it is overlain by the Oneota Dolomite, it thickens southward from 50 to 150 feet.

ORDOVICIAN SYSTEM

The Ordovician rocks, like the Cambrian, are all marine sediments and were deposited in a shallow sea that covered much of the interior part of the continent. They are subdivided into three series, all of which occur in the Chicago area (fig. 5). The lower, the Canadian Series, is largely dolomite but contains some sandstone; the middle, the Champlainian Series, is largely dolomite and limestone and has a prominent sandstone at the base; and the upper, the Cincinnatian Series, is largely shale and contains some limestone. The Canadian and lower Champlainian rocks do not crop out in the area, but they have been penetrated in many wells and are exposed along the Fox River only 3 miles west of the Chicago area in the Sandwich (15-minute) Quadrangle (Willman and Payne, 1943). The younger Ordovician rocks are exposed in the southwestern part of the area, particularly along the lower parts of the Kankakee, Des Plaines, and Du Page Rivers. The Ordovician strata range from 700 to 1,100 feet thick. They have been described in detail by Buschbach (1964).

Canadian Series

The lower Ordovician Canadian Series is largely dolomite but has sandstones at the base and near the top. The four formations in the series are combined as the Prairie du Chien Group. They are also part of the Knox Megagroup, which includes similar dolomite at the top of the Cambrian. In the northern third of the Chicago area, the Canadian Series was entirely eroded before the St. Peter Sandstone was deposited, but south of there the series thickens southward, reaching 300 feet near the southern boundary of the area.

Gunter Sandstone - The Gunter Sandstone consists of lenses of medium-grained sandstone present in places at the base of the Ordovician System. It contains a little dolomite and green shale and generally is less than 15 feet thick.

Oneota Dolomite - The Oneota Dolomite is largely coarse-grained dolomite 190 to 250 feet thick. The lower half is cherty, whereas the upper half is relatively pure. Oolitic chert nodules are common.

New Richmond Sandstone - The New Richmond Sandstone is fine- to coarse-grained quartz sandstone. It is dolomitic in places and locally contains oolitic and sandy chert at the top. It is not as well sorted as the St. Peter Sandstone and is more cross bedded. It has a maximum thickness of about 35 feet in the Chicago area.

Shakopee Dolomite - The Shakopee Dolomite consists of thin- to medium-bedded, fine-grained dolomite. Some beds are argillaceous and others are sandy. It contains thin beds of sandstone and green shale and lenticular masses of laminated dolomite that are algal reefs. The formation is as much as 70 feet thick. Its top is marked by the prominent sub-St. Peter unconformity.

Champlainian Series

The Champlainian Series consists of three groups of rocks (Templeton and Willman, 1963). The Ancell Group at the base is dominantly sandstone that unconformably overlaps older Ordovician and Cambrian formations. The Platteville Group above consists of slightly shaly and relatively pure limestone and dolomite formations. The Platteville is separated by minor unconformities from the groups above and below. The Galena Group at the top also is dominantly dolomite and limestone, and it contains distinctive red shale partings at the base. Because both are dominantly limestone and dolomite, the two groups are combined in the Ottawa Megagroup.

The oldest rocks well exposed in the Chicago area are in the Galena Group in a quarry at Central, north of Morris. However, a few shallow exposures farther west near Lisbon may be in the older Platteville Group. In a small area near Lisbon the Ancell Group (St. Peter Sandstone) lies directly beneath the glacial drift, and it is the oldest unit on the geologic map of the bedrock surface (fig. 9). The Champlainian Series ranges from 400 to 1,000 feet thick, but it commonly is 500 to 600 feet thick.

Ancell Group

St. Peter Sandstone - The St. Peter Sandstone is white, fine- and medium-grained, well sorted sandstone composed almost entirely of well rounded and frosted grains of quartz. At its base, a distinctive rubble of angular chert embedded in clay is the residue left from solution of the underlying formations. It is widely present, uneven in thickness, and locally as much as 100 feet thick where the formation is thick. Red and green shale also occurs at the base. The formation is commonly 100 to 200 feet thick, but where it fills valleys and sinkholes it is as much as 600 feet thick (Buschbach, 1964, pl. 6).

Glenwood Formation - The Glenwood Formation consists of sandstone, impure dolomite, and shale and is as much as 80 feet thick. In many localities it consists of only a few feet of sandstone, generally coarser grained and more poorly sorted than the St. Peter Sandstone below. The elevation of the top is shown in figure 12.

Platteville Group

Pecatonica Dolomite - The Pecatonica Dolomite consists of brown, relatively pure dolomite. It generally is sandy at the base and is separated by a minor unconformity from the Glenwood below. Locally it grades to pure, very fine-grained limestone. It is 20 to 50 feet thick.

Mifflin Formation - The Mifflin Formation consists of light gray, very fine-grained, thin-bedded limestone or dolomite that contains green or brown shale partings. It is 20 to 50 feet thick.

Grand Detour Formation - The Grand Detour Formation is also fine-grained limestone and dolomite, but it is light brownish gray, has dark gray mottling, is medium-bedded, and has thin red shale partings at the top. It is 20 to 40 feet thick.

Nachusa Formation - The Nachusa Formation consists of relatively pure, medium-grained, brown dolomite or limestone. It is similar to the limestone and dolomite in the overlying Galena Group and not readily separable from it where the basal Galena Guttenberg Formation with its distinctive red shale partings is absent. The Nachusa Formation has a maximum thickness of 50 feet, but it is absent in places. A minor unconformity at the top results in irregular thicknesses and accounts for the absence of the Quimbys Mill Formation, which overlies the Nachusa a short distance west of the Chicago area.

Galena Group

Guttenberg Formation - The Guttenberg Formation consists of brown dolomite, or limestone in places, distinguished by the presence of red speckling or thin, reddish brown shale partings. It locally contains a trace of fine quartz sand. It is as much as 15 feet thick but is absent in places.

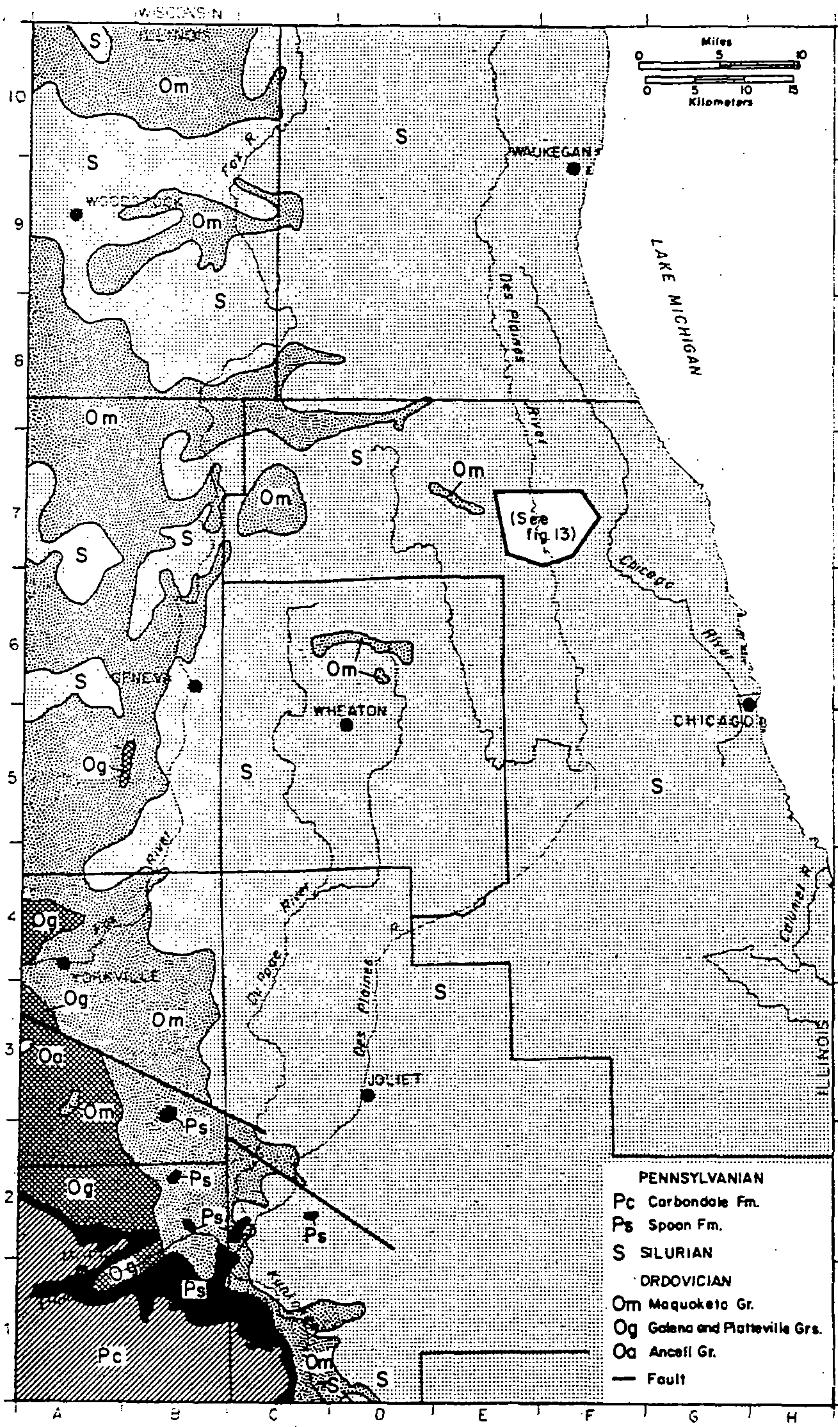


Fig. 9 - Geologic map of the bedrock surface (after Willman and others, 1967).

Dunleith and Wise Lake Formations - The Dunleith and Wise Lake Formations together consist of 170 to 210 feet of brown, pure, fine- to medium-grained dolomite, except in the southwestern part of the area where they are largely fine-grained limestone mottled with dolomite. West of the Chicago area, the Dunleith Formation is thin- to medium-bedded, light brownish gray, slightly argillaceous, cherty dolomite, whereas the Wise Lake is massive, vuggy, brown, pure dolomite. As the Dunleith becomes more pure and noncherty eastward, the two formations become similar, and they are not easily distinguished in the Chicago area.

The Wise Lake and Dunleith Formations crop out only in the southwestern part of the Chicago area (pl. 1), on the upthrown (south) side of the Sandwich Fault (fig. 12). About 80 feet of limestone is exposed in the quarry at Central in the Lisbon Quadrangle, 7 miles north of Morris (fig. 10B). This quarry appears to be largely in the Wise Lake Formation but the lower part may include part of the Dunleith Formation. The limestone in the quarry is mottled with dolomite which is recognized by its coarser grain size and darker color. Fossils are common in some beds (figs. 7 and 8). The Wise Lake Dolomite exposed along the Fox River at Millhurst, 2 miles west of the area, contains the distinctive sponge *Receptaculites* (fig. 7), the large gastropod *Hormotoma* (fig. 7), and other fossils.

Cincinnatian Series

The upper Ordovician Cincinnatian Series consists dominantly of gray and green shale, but it includes brown, red, and black shale. It has a persistent limestone formation in the middle and hematite oolites at the top. The shales are consolidated deposits of clay and silt carried into the interior sea when rivers from highlands along the eastern margin of the continent built large deltas in the Appalachian region. A minor unconformity occurs at the base of the series, and the sub-Silurian unconformity, which has valleys as much as 100 feet deep, occurs at the top. Because the sub-Silurian unconformity was produced by nearly vertical uplift, the strata above and below the unconformity are essentially parallel. All the Cincinnatian rocks in the Chicago area belong to the Maquoketa Group. They are exposed only in the southwestern part of the Chicago area (pl. 1), but they directly underlie the glacial drift at many places in the western part of the area (fig. 9).

Maquoketa Group

Scales Shale - The Scales Shale is largely gray shale, but the lower part is locally dark brown to nearly black in the southern part of the area. Much of the shale is dolomitic. Thin beds with small black phosphatic nodules and small pyritic fossils, called "depauperate beds," occur near the base and locally near the top. The trilobite *Isotelus* (fig. 7) is common in the shale between the upper depauperate bed and the overlying Fort Atkinson Limestone. The lower depauperate bed is not exposed in the area but is commonly encountered in drill holes. The upper bed and the *Isotelus*-bearing shale were formerly exposed in the H. I Green Company clay pit at Goose Lake, 4 miles north of Coal City (Coal City Quad.). The Scales Shale is 90 to 120 feet thick. There are few outcrops, and these expose only a few feet of the shale.

Fort Atkinson Limestone - The Fort Atkinson Limestone varies in composition. It consists of gray, fossiliferous, shaly limestone in outcrops along the Kankakee River near Wilmington (Wilmington Quad.); tan and pink, crinoidal, coarsely crystalline limestone (fig. 10C) overlying fine-grained dolomite near the Dresden Island lock and dam (Minooka Quad.) and north of Millsdale (Channahon Quad.); and mostly fine-grained dolomite interbedded with shale elsewhere. It is exposed only along the Kankakee River and the lower parts of the Des Plaines and Du Page Rivers. The formation is 20 to 30 feet thick in the outcrop area, but in drill holes elsewhere it ranges from 5 to 50 feet thick. The limestone contains a variety of fossils, with the brachiopod *Rafinesquina* (fig. 8) particularly abundant.

Brainard Shale - The Brainard Shale consists of greenish gray shale that is generally dolomitic and in places grades into silty argillaceous dolomite. It has a maximum thickness of 100 feet, but in some localities it is entirely truncated by the sub-Silurian unconformity. The Brainard is exposed on the east side of the Des Plaines Valley along the Atchison, Topeka, and Santa Fe Railroad 2 miles north of Millsdale and along the Du Page River and Rock Run 2 miles north of Channahon (Channahon Quad.).

Neda Formation - The Neda Formation consists of beds of hematite oolites interbedded with red and gray shale. It is present only where the Brainard Shale is thick, and in many parts of the area it was eroded away along the sub-Silurian unconformity (Workman, 1950). The formation has a maximum thickness of 15 feet. It is exposed along the Kankakee River in the Kankakee River State Park campground about 2 miles south of the Chicago area.

SILURIAN SYSTEM

The Silurian System, like the Ordovician, consists of deposits in the shallow interior sea. The strata are almost entirely dolomite that varies from extremely argillaceous, silty, and cherty to exceptionally pure. The lower part of the system consists of distinctive units that have lateral continuity throughout the region. The upper part is characterized by reefs of pure dolomite surrounded by well bedded, slightly argillaceous to very impure and generally cherty dolomite.

The entire Silurian System in the Chicago area was called Niagaran dolomite in early reports, but it now is differentiated into two series — the Alexandrian Series below and the Niagaran Series above (fig. 5). They are separated by a minor interruption in sedimentation. The upper Silurian Cayugan Series is not present in the area. The Silurian rocks are part of the Hunton Megagroup that farther south includes Devonian limestone and dolomite. Silurian strata crop out at many places in the southern half of the Chicago area (pl. 1). They were described by Fisher (1925); Savage (1926); Bretz (1939); Willman (1943, 1962); Lowenstam (1948, 1949); and others.

The Silurian System has a maximum thickness of nearly 500 feet in the southeastern part of the region (Suter et al., 1959, fig. 27). The top is eroded, but it is not far below the overlapping Devonian sediments that occur a short distance east in Indiana. Because of the eastward dip of the formations, the present bedrock surface successively truncates the Silurian formations from Lake Michigan westward to the margin of the Silurian rocks in the western part of the area. Much of this truncation was probably accomplished during the formation of the sub-Middle Devonian unconformity, because the Silurian strata are only 230 feet or less thick in the Des Plaines Disturbance (fig. 13) where they are overlain by shale of Upper Devonian-Mississippian age.

The Silurian rocks are generally fossiliferous, those in the reefs abundantly so (figs. 7 and 8). However, the fossils are preserved only as casts and molds. The original calcite and aragonite shells have been largely destroyed during recrystallization to dolomite.

Alexandrian Series

The Alexandrian strata filled the deep channels eroded in the underlying Maquoketa Group and overtopped the divides between the channels. Alexandrian strata vary from only 20 feet thick along the Kankakee River to as much as 150 feet in the deeper channels in the sub-Silurian surface.

Edgewood Dolomite - The Edgewood Dolomite changes progressively from highly argillaceous, dark gray dolomite in the lower part of the channels in the sub-Silurian surface to only slightly argillaceous, light brownish gray dolomite in the upper 25 feet. The upper zone is characterized by white chert in beds, lenses, and nodules. The formation has a maximum thickness of 100 feet. Where it thins over the divides between the channels, only the upper zone is present, and along the Kankakee River the formation is absent locally. The basal part of the thick Edgewood is well exposed along the Atchison, Topeka, and Santa Fe Railroad at the curve 5 miles southwest of Joliet (fig. 10D), and the eastward dip of the beds brings the upper cherty beds to the level of the railroad about a mile northeast of the curve (Channahon Quad.).

Kankakee Dolomite - The Kankakee Dolomite consists of fine- to medium-grained, gray to pinkish gray dolomite in wavy beds 1 to 3 inches thick that are separated by thin partings of green shale (fig. 11C). Chert nodules are locally present but are not abundant. The formation is 40 to 50 feet thick in much of the area, but between Joliet and the Kankakee River southeast of Wilmington it thins to 20 feet.

The Kankakee Dolomite is well exposed in its type locality along the Kankakee River, just south of the area (Herscher 15-minute Quad.); in the Des Plaines Valley bluffs and quarries on the southwest side of Joliet (Channahon, Elwood and Joliet Quads.); in deep quarries at Elmhurst (Elmhurst Quad.), Hillside (Hinsdale Quad.), and the Stearns quarry at 26th Street and Archer Avenue in Chicago (Englewood Quad.); and along the Fox Valley southwest of South Elgin (Geneva Quad.) and east of Oswego (Aurora South Quad.).

The lower few feet of the Kankakee is more massive and contains abundant corals, scattered quartz sand grains, and small, bright green grains of glauconite. The fossil brachiopod *Platymerella manniensis* (fig. 8) is abundant in white chert nodules at or near the base in nearly all exposures.

The uppermost bed of the Kankakee Dolomite is a distinctive white, pure, massive dolomite about 2 feet thick that is an important key bed in the Silurian section. It contains the large brachiopod *Pentamerus oblongus* (fig. 8), commonly in closely packed clusters. A similar shell called *Microcardinalia pyriformis* (fig. 8) is regionally persistent in this bed and is a guide fossil to the top of the Alexandrian Series. The top of the bed has a distinctive surface that is smooth and flat in comparison with other bedding planes. However, the smooth surface has sharp pits one-fourth to one-half inch wide and equally deep, most of them filled with green clay. The pits are more or less regularly distributed, roughly 10 to 15 to a square foot. This bed is recognized throughout the area, and because it varies only a few inches in thickness, the smooth surface on top can hardly be an erosional surface. It appears more likely to be a solution surface, also called a corrosion surface, formed by a change in the sea water that favored solution rather than deposition. The pits may have been made by stems or roots of plants attached to the sea floor.

Fig. 10 - Exposures of Ordovician, Silurian, and Pennsylvanian formations

A - Carbondale Formation (Pennsylvanian) overlain by glacial till of the Wedron Formation (the smooth surface at top) along Waupecan Creek, $2\frac{1}{2}$ miles southwest of Morris (Morris Quad.). The cross-bedded Vermilionville Sandstone Member at the top of the Carbondale overlies 12 feet of Canton Shale (smooth surface). A ledge of black slaty shale lies at the base of the Canton Shale and below it is a prominent ledge of the Covel Conglomerate with associated limestone lenses.

B - Limestone of the Galena Group (Ordovician) in quarry at Central, 7 miles north of Morris (Lisbon Quad.). The quarry face is about 50 feet high.

C - Fort Atkinson Limestone (Ordovician) along the Elgin, Joliet, and Eastern Railroad at Divine, 1 mile southwest of Dresden Island Lock and Dam (Minooka Quad.). The limestone is crinoidal and pink and the beds are lenticular.

D - Edgewood Dolomite (Silurian) filling channel 4 feet deep in Maquoketa Group shale (Ordovician) along the Atchison, Topeka, and Santa Fe Railroad south of curve, 5 miles southwest of Joliet (Channahon Quad.).

E - Racine Dolomite (Silurian) showing massive dolomite of reef core exposed in Material Service Corporation Stearns quarry, 26th Street and Archer Avenue, Chicago (Englewood Quad.).

F - Racine Dolomite (Silurian) showing well bedded, dipping, reef-flank beds in Material Service Corporation quarry at Thornton (Calumet City Quad.).

Niagaran Series

Joliet Dolomite - The Joliet Dolomite is 40 to 60 feet thick and has three distinctive units. The basal unit, 5 to 20 feet thick, is shaly and is characterized by interbedded red coarse-grained dolomite and greenish gray, fine-grained, argillaceous dolomite. The beds are separated by red and green shale partings. Near the middle of the basal unit a bed of green shale as much as 3 feet thick is present locally. The middle unit, 20 to 30 feet thick, consists of medium-bedded, light gray, nearly white, fine-grained, cherty dolomite that is very silty at the base but grades to only slightly silty at the top. The upper unit, 20 to 25 feet thick, is nearly white, locally mottled pink, vuggy, pure dolomite. It is thin bedded but the bedding is faint. The lower part contains a few beds of white chert (fig. 11D).

The type section of the Joliet Dolomite is in the National Stone Company (Vulcan Materials) quarry at Joliet (Joliet Quad.) (fig. 11D). The formation is well exposed in other quarries at Joliet, in the south bluffs of the Des Plaines Valley west of Joliet (Elwood Quad.), along the Du Page River at Naperville (Naperville and Normantown Quads.), along the Fox Valley at Batavia and Aurora (Aurora North Quad.), and in the same deep quarries as the Kankakee Dolomite.

Waukesha Dolomite - The Waukesha Dolomite was called the "Athens marble" when it was quarried extensively for building stone used in constructing many buildings in Chicago and throughout the region. It is a slightly silty, dense to finely vuggy, fine-grained dolomite that occurs in smooth-surfaced beds that commonly are 2 to 8 inches thick but are locally as much as 3 feet thick. It is light brownish gray and weathers brown. It is exposed at the top of the National Stone Company quarry at Joliet (fig. 11D), in the Des Plaines River bluffs from Joliet northward to Romeo and eastward to Sag Bridge (Joliet, Romeoville, and Sag Bridge Quads.), and in the deep quarries at Elmhurst and Hillside. The formation is 20 to 30 feet thick in the outcrop areas, but it is locally missing in the subsurface in the eastern part of the region.

Racine Dolomite - The Racine Dolomite is as much as 300 feet thick along the eastern edge of the region, but it thins westward because of truncation by the present bedrock surface. The lowest beds are exposed at the top of the Des Plaines Valley bluffs from Joliet to Sag Bridge. The lower and middle parts are exposed in the quarries at Hillside (Hinsdale Quad.) and Elmhurst (Elmhurst Quad.). The quarries at Hodgkins, McCook, and LaGrange (Berwyn Quad.) are in the middle part. The upper part is exposed in the Stearns quarry in Chicago (Englewood Quad.), in the Thornton quarry (Calumet City Quad.), and in small exposures at Stony Island (Lake Calumet Quad.) and Chicago Heights (Calumet City Quad.).

The Racine Dolomite is characterized by the presence of large reefs, some of which grew to heights of 100 feet or more above the surrounding sea floor. Some reefs are nearly circular, some are oval, and some are in overlapping complexes. The dolomite in the reefs is exceptionally pure, containing only traces of argillaceous material

Fig. 11 - Exposures of Silurian formations

A - Racine Dolomite (Silurian) showing a reef with dipping beds in the upper third of the quarry face overlying horizontally bedded inter-reef rock. Federal quarry of the Material Service Corporation at La Grange (Berwyn Quad.).

B - Racine Dolomite (Silurian) showing a crevice, or joint, in the dipping flank beds of a reef. The crevice contained shale with Mississippian-Devonian shark's teeth. Material Service Corporation quarry at Thornton (Calumet City Quad.).

C - Kankakee Dolomite (Silurian) showing the typical thin and wavy beds overlying the massive bed that occurs at the base of the formation. Small quarry along Atchison, Topeka, and Santa Fe Railroad, 1.5 miles southwest of Brandon Bridge (Channahon Quad.).

D - The Waukesha Dolomite (Silurian), the well bedded dolomite in the upper fifth of the 75-foot quarry face. It overlies the Joliet Dolomite (Silurian), the upper half of which (darker colored) is the relatively pure massive unit with thin beds of white chert. The lower part (lighter colored) is the well bedded, slightly silty middle Joliet unit. National Stone Company quarry on the south side of Joliet (Joliet Quad.).

and rare, isolated sand grains. With a few minor exceptions, the reef rock contains no chert. The dolomite is medium gray, mottled with light or dark gray. Because it has a low iron content, it weathers gray. Most beds are conspicuously vuggy. In a few localities the vugs are partly filled with asphaltum, a solid petroleum residue that on hot days melts and oozes from the vugs on quarry faces.

The reefs are surrounded by argillaceous and silty dolomite, and lenses of green shale are locally present. In contrast to the dolomite of the reefs, the interreef rock is fine grained, dense, commonly cherty, light brownish gray, and weathers brown. Small reefs consisting of lenses of massive, pure dolomite occur on the slopes of the major reefs and in the interreef beds.

The larger reefs have a central area, or core, of massive to irregularly bedded dolomite (fig. 10E). The marginal areas, broader than the core in some reefs, consist of dipping beds, called flank beds (fig. 10F). The flank beds entirely surround some reefs and show the successive stages of outward growth of the reef, partly by growth of reef-building organisms on the outer slope of the reef, partly by deposition of debris eroded by waves and washed down the flank. The beds dip as much as 30 degrees, but at their outer margin they flatten and grade into argillaceous interreef types of sediments. In places the argillaceous beds continue short distances up the flanks, showing intermittent encroachment of the interreef sediments. When the reefs ceased to grow, they were entirely overlapped by the argillaceous sediments.

The lowest base of a large reef is at the top of the Joliet Formation. Other reefs start at higher positions (fig. 11A). Some extend to the top of the Racine Formation and probably extended higher before being eroded along the sub-Middle Devonian unconformity.

A large reef has been progressively exposed during development of the quarry of the Material Service (General Dynamics) Corporation at Thornton (Harvey and Calumet City Quads.). The transition from the reef core through reef flank deposits and marginal reefs (fore reefs) to interreef rocks is well exposed, and the lithology, structure, and paleontology of the reef have been described in numerous reports (Bretz, 1939; Lowenstam, 1950; Lowenstam, Willman and Swann, 1956; Willman, 1962; Ingels, 1963).

DEVONIAN SYSTEM

Rocks of Devonian age are present in the Chicago area beneath Lake Michigan, only a few miles offshore, and the entire area was probably covered by several hundred feet of Devonian rocks that were deposited in the middle and late Devonian seas. Devonian limestone overlain by black shale occurs in Indiana only a short distance east of the Illinois-Indiana state line. Black shale, probably the Grassy Creek Shale of Upper Devonian age, has been found in pockets on top of the Silurian dolomite at Elmhurst. Shale in joints in the Silurian Dolomite in the Thornton reef contains sharks' teeth that are Devonian or Mississippian in age (Bretz, 1939) (fig. 11B). The shale assigned to the Mississippian Hannibal Formation in the fault blocks of the Des Plaines Disturbance (fig. 13) may be equivalent to the Ellsworth Formation of Michigan and Northern Indiana, in which case only the uppermost part is Mississippian and the lower part is late Devonian in age (J. A. Lineback, personal communication).

MISSISSIPPIAN SYSTEM

Rocks of Mississippian age at one time probably covered the entire Chicago area, but they are now present only in the fault blocks of the Des Plaines Disturbance and are not exposed (fig. 13). In the fault blocks as much as 500 feet of shale and siltstone is assigned to the Hannibal Shale of early Mississippian (Kinderhookian) age, although, as previously noted, it may include a large proportion of late Devonian shale. The shale is overlain by 200 feet of cherty limestone, the Burlington-Keokuk Limestone of middle Mississippian (Valmeyeran) age. The Devonian-Mississippian rocks overlie Silurian dolomite and are overlain by Pennsylvanian shale. As Pennsylvanian strata rest directly on pre-Devonian rocks in the southern part of the area and for 50 miles farther southwest, the preservation of the Devonian and Mississippian rocks on the high part of the Kankakee Arch is anomalous, and it suggests that there may have been faulting in the Des Plaines structure in late Mississippian or early Pennsylvanian time.

PENNSYLVANIAN SYSTEM

The rocks of the Pennsylvanian System were originally called "Coal Measures" because they contain the important coal seams. Pennsylvanian rocks underlie the southwestern corner of the Chicago area (fig. 9) and are well exposed along the Mazon River (Coal City Quad.), along Waupecan Creek (Morris Quad.), in the coal strip mines near Coal City, and along the lower few miles of the Kankakee River (Coal City and Wilmington Quads.) (pl. 1). Pennsylvanian rocks formerly covered the entire Chicago area. They have been eroded from the area north and east of Joliet, except in the Des Plaines Disturbance where they occur in a fault block (fig. 13). They are the youngest bedrock formations exposed in the Chicago area and belong to the Desmoinesian Series. They were deposited during the middle part of the Pennsylvanian Period. However, in a few localities the basal Pennsylvanian strata may belong to the older Atokan Series.

The Pennsylvanian rocks are largely shale and sandstone, but they differ notably from the older Paleozoic formations, which are largely thick units dominated by a single rock type — dolomite, sandstone, or shale. The Pennsylvanian succession consists of much thinner units and many more types of rock.

During Pennsylvanian time the sea repeatedly advanced over the area from the south. Consequently, the deposits are alternately marine and nonmarine. The deposits of a marine-nonmarine cycle are called a cyclothem and are generally arranged in the same order in successive cyclothems. The base of a typical cyclothem is fine-grained, silty, micaceous sandstone or sandy siltstone, overlain successively by sandy shale, nodular limestone, claystone (also called underclay), coal, and gray shale. These are the nonmarine units of the cyclothem. In some areas the gray shale at the top is a marine or brackish-water deposit. Above the gray shale, or where it is absent, resting directly on the coal, is a black, slate-like shale that contains marine fossils and, in places, large oval concretions of limestone. The black shale is overlain by fossiliferous, gray, slightly argillaceous limestone or by limestone and calcareous shale interbedded. Above the limestone is a gray shale, the lower part of which generally contains marine fossils. These are the marine units in the cyclothem Above the gray shale is the sandstone that forms the basal unit of the next higher cyclothem. In places the sandstone fills channels that cut into the shale and locally extend down to the coal or below.

Successive cyclothems are never identical, because some units are missing and units that correspond differ in thickness and in minor lithologic characteristics. The cyclothems vary from a few to 75 feet thick, depending largely on the thickness of the sandstones and the degree to which they truncate the underlying cyclothems.

Parts of three cyclothems are exposed along the Mazon River near the mouth of Johnny Run (Coal City Quad.) and along Waupecan Creek for a mile south of the Boy Scout Camp (Morris Quad.) (fig. 10A). In both of these areas the section exposed begins with the Vermilionville Sandstone Member, which is the basal unit of the Brereton Cyclothem, and extends downward through the St. David and Summum Cyclothems. The St. David Cyclothem lacks a coal and a basal sandstone in this area. The position of the sandstone is occupied by a distinctive but thin bed of limestone conglomerate, the Covel Conglomerate Member. The conglomerate is only a foot or two above the Hanover Limestone Member in the Summum Cyclothem. Farther down the two valleys the Pleasantview Sandstone Member at the base of the Summum Cyclothem is exposed, and below it the Francis Creek Shale Member also is exposed. The Francis Creek Shale, the underlying Colchester (No. 2) Coal, and the underclay of the coal are included in the Liverpool Cyclothem and are exposed in the strip mines. Immediately south of the Chicago area, and perhaps locally within the area, the Lowell Cyclothem is present above the Francis Creek Shale and below the Pleasantview Sandstone, and the Liverpool Cyclothem is replaced by the Lowell (above) and Tonica Cyclothems. Below the Liverpool Cyclothem the Pennsylvanian strata are less uniform and include interbedded clays, thick local sandstones, and thin beds of shale and limestone. They probably represent several cyclothems.

As the distinctive individual units in the cyclothems are not thick enough to be practical formations, the Pennsylvanian rocks are divided into larger units that show major changes in the dominant rock types. In the Chicago area the strata belong to two formations, the Spoon Formation below, in which the coals are generally thin or local, and the Carbondale Formation above, which contains the principal commercial coals and extends from the Colchester (No. 2) Coal Member at its base to the Danville (No. 7) Coal Member at its top. However, the upper part of the Carbondale Formation is eroded in this area. The Pennsylvanian strata preserved in the Des Plaines Disturbance consist of 30 feet of gray and black shale containing a bed of coal. They are included in the Spoon Formation, although their precise position in the Spoon is not known and they may include some beds of the Abbott Formation. The Spoon and Carbondale Formations make up the Kewanee Group.

The Pennsylvanian strata in the Chicago area were described by Cady (1915); Culver (1922); Willman and Payne (1942); W. H. Smith (1968); Smith et al. (1970); and Peppers (1970).

Spoon Formation - All the Pennsylvanian strata in the Chicago area that underlie the Colchester (No. 2) Coal Member are assigned to the Spoon Formation. The basal Pennsylvanian rocks vary from place to place, partly because they overlap the uneven surface of the sub-Pennsylvanian unconformity, and consequently the specific identity of isolated exposures is not easily established. Some of the basal sandstone, for example that along the Kankakee River at the county line bridge (Wilmington Quad.), could be part of the Abbott Formation that underlies the Spoon farther south. A sandstone containing quartz pebbles, which was exposed half a mile south of Channahon (Channahon Quad.) before it was covered by the lake above the Dresden Island dam, resembled conglomeratic sandstone in the still lower Caseyville Formation, which is widely developed in southern Illinois. In the same outcrop the sandstone was overlain by a fossiliferous blue-gray limestone that is like the Seville Limestone Member in the Spoon Formation in western Illinois.

The Spoon Formation is exposed in the Goose Lake clay pit 4 miles north of Coal City (Coal City Quad.), along the lower 2 miles of the Kankakee River (Wilmington and Coal City Quads.), and along Aux Sable Creek near the Illinois and Michigan Canal (Minooka Quad.). Except at Goose Lake, where the beds are largely clay but include thin coal, limestone, and shale, the Spoon Formation is mostly shale and sandstone. The formation has a maximum thickness of 75 feet where it is overlain by the Carbondale Formation.

Carbondale Formation - The Carbondale Formation consists of all the Pennsylvanian strata in the Chicago area above the base of the Colchester (No. 2) Coal Member. Because of its southwesterly dip, the formation thickens from the outcrop of the coal to about 125 feet in the extreme southwestern part of the area. The No. 2 Coal is generally about 3 feet thick, but it varies from 2 to 4 feet. It is the only commercial coal in the area. It is best exposed in the strip mines south of Braidwood (Wilmington Quad.). In the outcrops, the Summum (No. 4) Coal Member is only 1 to

2 inches thick and the Springfield (No. 5) Coal Member is absent, but both are locally present and thicker in the subsurface just south of the area. The Carbondale Formation includes two sandstones 10 to 20 feet thick. The Pleasantview Sandstone Member, in the interval between the No. 2 and No. 4 Coals, is exposed along the Mazon River 2 miles northwest of Carbon Hill (Coal City Quad.) and at Pine Bluff Bridge, 2 miles southeast of Morris (Morris Quad.). The Vermilionville Sandstone Member, above the No. 5 Coal, is the youngest Pennsylvanian bed in the area, and it is well exposed along Waupecan Creek $3\frac{1}{2}$ miles south of Morris (Morris Quad.) (fig. 10A).

The gray shale that overlies No. 2 Coal — the Francis Creek Shale Member — is famous world-wide for the "Mazon Creek fossils," which occur in concretions in the lower few feet of the shale (fig. 8). These oval-shaped concretions are commonly half an inch to 2 inches thick and from 2 to 6 inches long. A few are considerably larger. They are largely siderite (iron carbonate) and have a thick outer rim of limonite produced by weathering. Only 5 to 10 percent of the concretions contain well preserved fossils, and these can be easily split parallel to the bedding. Although plants of great variety are by far the most common fossils, many types of animals — amphibians, insects, crabs, worms, lung fish, and many others — have also been found (for references see Willman et al., 1968, and Smith et al., 1970). The lower part of the shale, which contains the fossiliferous concretions, is exposed along the Mazon River at two localities, $1\frac{1}{2}$ and 2 miles southeast of Pine Bluff Bridge (Coal City Quad.), and also in the coal strip mines. Concretions are generally common higher in the shale but are rarely fossiliferous. Even in the mined areas fossiliferous concretions are only locally abundant. They are exposed when rain washes the waste piles of the strip mines and the conical waste piles from the underground mines.

BEDROCK STRUCTURE

The bedrock formations were deposited on slopes that had only slight inclinations, and as a result the bedding planes were essentially flat. Some beds of the sandstones and coarse-grained limestones, however, are steeply inclined, or crossbedded. In much of the Chicago area the dips of the beds are too slight to be observable in individual outcrops. However, comparison of the elevations of the same bed in exposures only a few hundred feet apart generally shows even slight dips.

As the area has been subjected to regional tectonic movements (described in the section on stratigraphic relations), none of the formations shows its original depositional slope — in fact, many now dip in a different direction. Furthermore, the Paleozoic formations are not all parallel. During the Ordovician Period, before the St. Peter Sandstone was deposited, the formations were tilted and eroded. Tectonic movement also occurred before Middle Devonian deposition and again before Pennsylvanian deposition (fig. 6). As a result, the formations meet at low angles at all of these unconformities. This effect is distinctly noticeable at points a few miles apart, and the divergence of the formations can be determined by comparing structure maps of different units (Suter et al., 1959; Buschbach, 1964).

Although the Chicago area is on the crest of the broad, gentle-sloped Kankakee Arch (fig. 1), the strata have a general eastward dip that results from the eastward plunge of the arch (fig. 12). The broad regional movements were accompanied by local warping that produced gentle anticlinal and synclinal structures that have east-west axes (Suter et al., 1959, fig. 16). The beds were broken in some places, and faults that have displacements of a few feet to as much as 20 feet are not uncommon. Major faults occur in the Sandwich Fault Zone in the southwestern part of the region and in the Des Plaines Disturbance northwest of Chicago.

The major structural features are depicted on a structure map (fig. 12) that shows the variations in elevation of the top of the Glenwood Formation, or of the St. Peter Sandstone where the Glenwood is absent. This horizon is also the base of

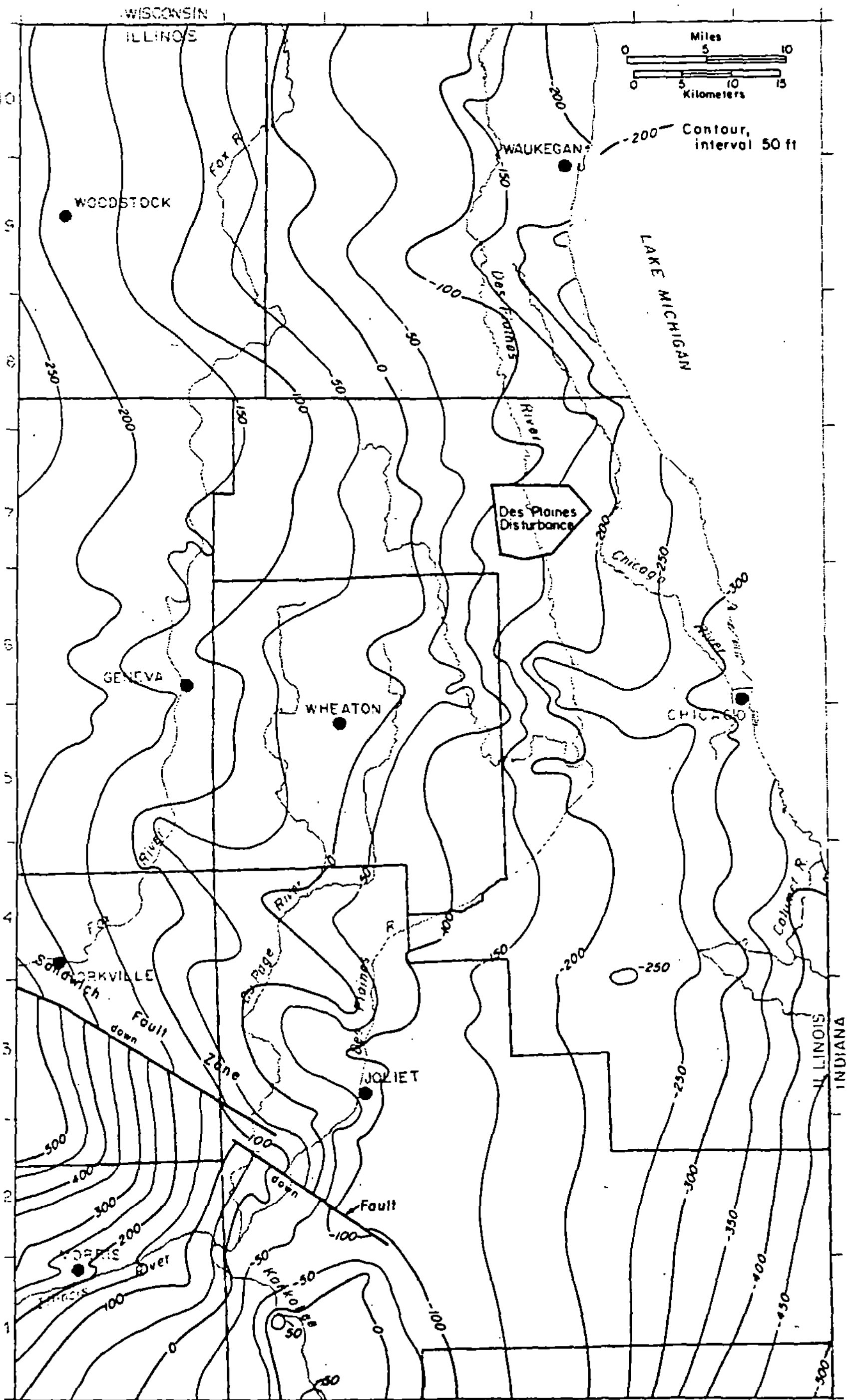


Fig. 12 - Geologic structure of the Chicago area. Contours on top of the Glenwood and St. Peter Sandstones (after Buschbach, 1964).

the Platteville Group (fig. 5). The top of the Glenwood Formation is more than 500 feet above sea level in the southwestern part of the area, but it is 500 feet below sea level in the southeastern corner, a decline of 1,000 feet in 50 miles and an average of 20 feet per mile. Throughout most of the Chicago area the dip is 10 to 15 feet per mile.

Sandwich Fault Zone

The Sandwich Fault Zone (fig. 12) extends southeastward from the vicinty of Oregon for a distance of about 80 miles, into the southern part of the Chicago area (Willman and Templeton, 1951; Suter et al., 1959; Buschbach, 1964; Willman and others, 1967). Where exposed near its northwestern end, the fault is about 100 feet wide and the rocks are intensely sheared. The bordering rocks are broken by many faults that have small displacements. The fault zone appears to be nearly vertical and, relative to each other, the rocks on the north side were moved down and those on the south side were moved up. The drag, or upward bend, of the rocks on the downthrown side of the fault is exposed along the Fox River at Millhurst, 2 miles west of the boundary of the Chicago area. The maximum displacement of the beds is 900 feet 20 to 30 miles west of the Chicago area, but near the ends of the fault, the displacement diminishes abruptly. At the western edge of the Chicago area, the displacement is about 250 feet, which decreases eastward to zero in about 18 miles.

A few miles farther east on nearly the same alignment, a fault that has a maximum displacement of about 100 feet has the downthrown side on the south. If it is directly connected with the Sandwich Fault Zone, only a scissors-like movement on the fault plane can explain the difference in direction of displacement. The eastern fault is generally interpreted as a parallel fault slightly offset to the south. The place where it crosses the Des Plaines Valley is shown on plate 1. The fault plane is not exposed, but the change from Ordovician rocks north of the fault to Silurian at the same level on the south can be observed (Channahon Quad.).

The youngest rocks broken by the Sandwich Fault Zone are Silurian in age, and the faulting, therefore, is younger than Silurian. Although Pennsylvanian rocks have been eroded from the Sandwich Fault Zone, major folding and faulting west and south of the Chicago area involved Pennsylvanian rocks. The fault zone therefore may be post-Pennsylvanian in age, and it most likely is related to the major disturbance at the end of the Paleozoic Era.

Des Plaines Disturbance

The Des Plaines Disturbance (fig. 13) is an unusual structural feature, the origin of which has aroused much discussion. At Des Plaines in northwestern Cook County, the rocks in an area about 5½ miles in diameter are intensely faulted. Displacements as much as 600 feet bring rocks as old as the St. Peter Sandstone and Oneota Dolomite to the bedrock surface in the central part of the structure and carry downward Mississippian and Pennsylvanian strata that are not present elsewhere in the region nearer than 50 miles. The disturbance is surrounded by nearly horizontal Silurian dolomite in which drilling has revealed no faults.

The description and interpretation of the structure by Emrich and Bergstrom (1962) are based on the records of 295 wells and the study of samples from 102 of the wells. The wells provide all the information that is available. The bedrock is buried beneath 75 to 200 feet of glacial drift, and there is no indication of the structure on the present surface. The structure is probably even more complex than is indicated by the drill data.

The intensity of the deformation in a local, roughly circular area relates the structure to others widely scattered through the Midwest that are called cryptoex-

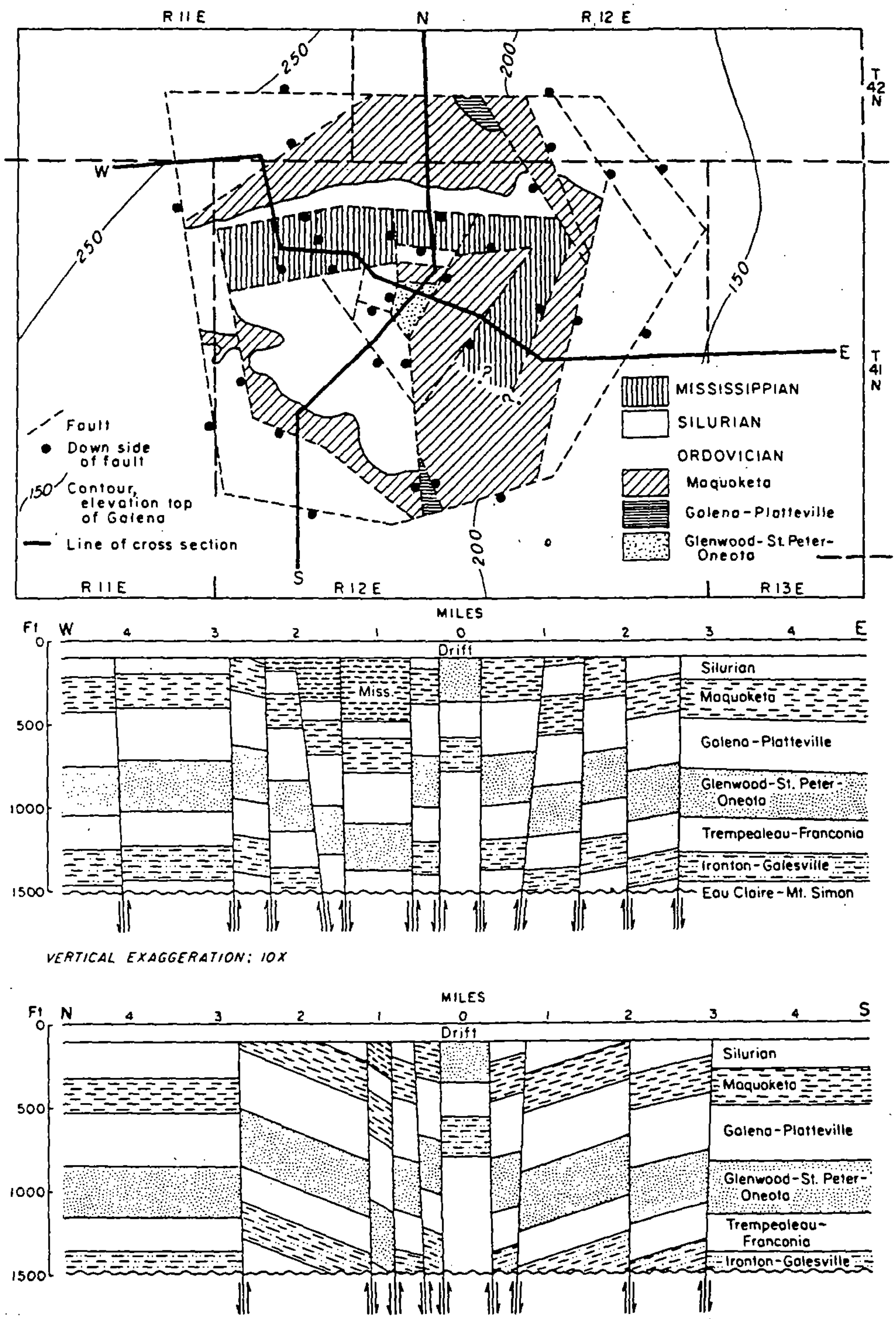


Fig. 13 - Geologic map and cross sections of the Des Plaines Disturbance (after Emrich and Bergstrom, 1962).

plosion structures. Earlier these structures were thought to be formed by the sudden release of gases from below and were called cryptovolcanic structures. More recently shatter cones, minerals formed only at very high pressures, and explosion breccias have been found in many of the other structures. This evidence suggests that these structures were formed by the impact of meteorites.

Because the Des Plaines structure is not exposed, these features are not observable, and they have not been found in the few available cores. Furthermore, the faults appear to be essentially vertical. In most wells a normal sequence is found below whatever the uppermost rock happens to be, which suggests that the beds in the fault blocks are nearly horizontal (fig. 13). In other structures more definitely formed by meteorite impact, the beds in many of the fault blocks are nearly vertical. Although the Des Plaines structure, like the others, has a central uplift, the intensity of deformation is much less. If the Des Plaines Disturbance is the result of a meteorite impact, it may be only the lower part of the deformed zone, where the deformation was diminishing. More than 1,000 feet of younger Paleozoic rocks, now absent, could have been present over the Silurian strata in this area near the end of the Paleozoic Era.

As Pennsylvanian rocks are present in the structure, it is late Pennsylvanian or younger in origin. However, the presence of 700 feet of late Devonian and Mississippian rocks in some of the fault blocks and their absence beneath the Pennsylvanian rocks in the southern part of the area and for 50 miles farther south suggests, although it does not prove, that some of the faulting is pre-Pennsylvanian. If the faulting occurred at more than one time, the structure was not formed by meteorite impact. Therefore, origin by meteorite impact, although favored, remains uncertain.

BEDROCK SURFACE

The surface of the bedrock (fig. 14) is an undulating plain in which steep-sloped valleys as much as 100 to 150 feet deep are entrenched (Horberg, 1950; Piskin and Bergstrom, 1967). The slopes on the bedrock surface are rarely parallel to the slopes of the present topography (fig. 20), and it is apparent that the modern rivers and streams have had little to do with formation of the bedrock surface. The glacial deposits almost completely filled the valleys in the bedrock surface, and the glaciers left their own distinctive topography. This resulted in the establishment of new drainage lines generally discordant with the earlier valleys. Except for a few miles, and there more or less accidentally, the present valleys are not reexcavated bedrock valleys.

The surface of the bedrock is the sub-Pleistocene unconformity. It truncates the Paleozoic formations (fig. 9), and the influence of differences in hardness, or resistance to erosion, is evident only locally. The surface passes from the Silurian and Ordovician dolomites westward to the shale of the Maquoketa Group and southwestward to the Pennsylvanian sandstones and shales, but the boundaries are not apparent on the bedrock surface map (fig. 14). The bedrock surface drainage divide (fig. 21), which would separate the Great Lakes and Mississippi River drainage if it were the present surface, is on the Silurian dolomite in the southern part of the area, but it turns westward onto the Maquoketa Shale in the central western part.

Although the beveled surface of the bedrock formations may be attributed partly to inheritance from older erosional surfaces, the surface is fresh and unweathered under the glacial drift. The preglacial surface probably was shaped and generally lowered, perhaps 100 feet or more, by glacial erosion. The sharp valleys in the bedrock surface are the lower parts of deeper valleys that were cut during the Sangamonian Stage of deglaciation, or possibly earlier, were then truncated by the Wisconsinan glaciers, and were finally filled with Wisconsinan drift.

A deep buried valley extending northeastward from Joliet (fig. 14) is called Hadley Valley (Horberg and Emery, 1943; Bretz, 1955; Suter et al., 1959). At the divide where it connects with a northeastward-sloping valley, the Hadley Valley is still entrenched about 100 feet into the bedrock surface. It is nearly 100 feet lower than the bedrock divide along the channel of the Des Plaines Valley, which was entrenched in the bedrock surface by the Outlet River of Lake Chicago. Hadley Valley may have been formed by the overflow of a glacial lake, an ancestral Lake Chicago, which formed in the Lake Michigan Basin when the Illinoian glacier retreated or the Wisconsinan glacier first advanced. It was overridden by the Wisconsinan glaciers and partially filled with glacial deposits. Short segments were reexcavated by Spring Creek (Mokena Quad.).

GLACIAL STRATIGRAPHY

QUATERNARY SYSTEM

The Quaternary System consists of all the rocks younger than the Tertiary, including those accumulating at present. As the system contains only one series, the Pleistocene, the terms Quaternary and Pleistocene apply to the same rocks (fig. 15).

PLEISTOCENE SERIES

The Pleistocene Series includes all the unconsolidated rock formations in the Chicago area that overlie the Paleozoic bedrock. These deposits are related predominantly to the glaciers that repeatedly covered the area, but they also include deposits made since the glaciers melted — by rivers and streams, by slopewash and slumping, by sedimentation in lakes and ponds, and by the work of man.

The advancing glaciers eroded the bedrock formations, as is evident from the scratches (striations) on the bedrock surface, and the lower parts of the glaciers became loaded with rock debris of all sizes from clay and silt to cobbles and boulders. Shearing movements in the ice produced a grinding action that pulverized many rocks to small fragments and thoroughly mixed materials from many different rock formations.

When the ice melted it deposited a material called till (fig. 17A) that is an unsorted mixture of rock fragments of all sizes. The kind and size of the rocks in the till are both related to the kinds of rocks overridden by the glacier. Because the glaciers took different courses across different rock formations, they deposited tills with different compositions. Mineral and grain-size analyses, therefore, are useful in differentiating some of the tills.

As the glaciers melted, water flowing in channels on, in, and below the ice picked up rock debris and began the process of sorting it by size. When reduction in volume or velocity of the water resulted in quick deposition of the coarser materials in channels in the glacier or along its margins, much of the clay and silt remained in suspension and was carried away from the ice. The sand and gravel thus deposited is poorly sorted and has irregular and distorted bedding (fig. 17C). These ice-contact sand and gravel deposits occur in conical hills (kames), in elongate ridges (eskers), and in lenses within the till sheets.

Sand and gravel transported away from the ice by meltwater streams before it was deposited is better sorted and is called outwash. Sheet-like deposits of outwash along the front of the glaciers are called outwash plains. Outwash deposits in valleys are called valley trains. When the outwash was carried by the streams into lakes, the materials were further sorted. Near the shore, sand and gravel were deposited in beaches, bars, spits, and deltas, while clay, silt, and fine sand were deposited in the deeper water.

Water flowing from glaciers transports large quantities of silt, clay, and sand. These fine-grained materials give the meltwaters of modern glaciers a cloudy, or

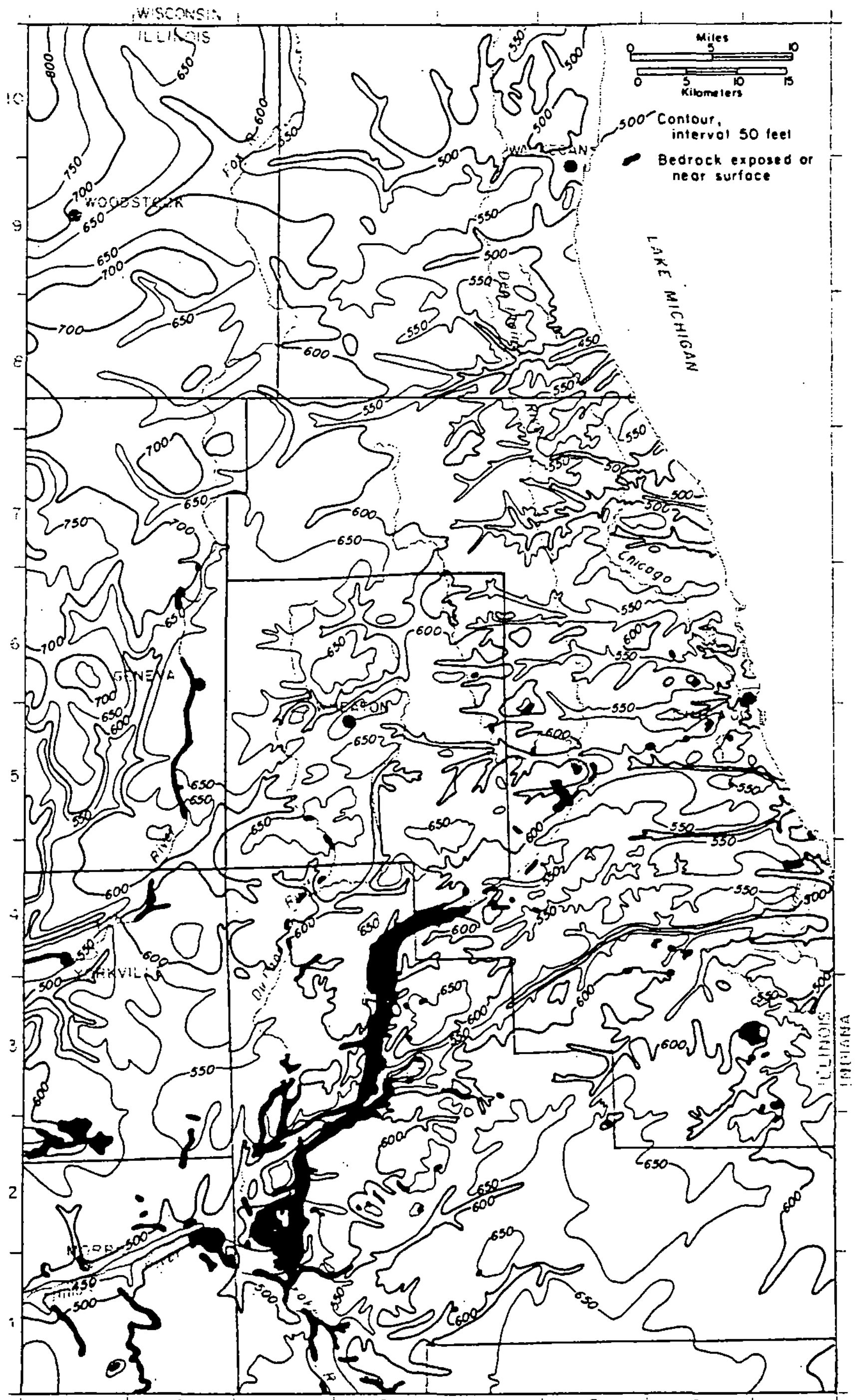


Fig. 14 - Topographic map of the bedrock surface (after Suter et al., 1959).

milky, appearance. When deposited in river bottomlands and exposed to drying winds during low-water stages, such materials are subject to erosion by wind. Wind is more selective than flowing water in its sorting action. It leaves the sand behind in slow-moving dunes and carries silt and clay in clouds onto adjacent bluffs and uplands, first depositing the coarser silt and then, at greater distances, progressively thinner and finer grained silt and clay. The deposits of wind-blown silt and clay are called loess.

The stratigraphic nomenclature of the Pleistocene deposits in the Chicago area is shown on figure 15. The classification to which each unit belongs is identified by the word following the geographic name. Pleistocene nomenclature is complicated by the naming of many individual features and events, such as Lake Chicago, Calumet lake stage, Toleston beach, Glenwood spit, Chicago Outlet River, Kaneville Esker, Kankakee Flood, and many others. These are not stratigraphic units. The Glenwood spit, for example, is only one of many spits that were built into Lake Chicago. The deposits forming these spits are part of the Dolton Member of the Equality Formation in the rock-stratigraphic classification. The names of many features and events are identified in the section on glacial history.

Although the repeated fluctuations of the glaciers produced many different units, exposures of more than two or three in a single outcrop are not common. Exposures of the Barlina, Huntley, Gilberts, and Marengo Drifts in sequence along the Huntley road 2 miles west of Algonquin (Crystal Lake Quad.) is exceptional. The stratigraphic sequence of units in the drift is better determined by studying samples from drill holes (Horberg, 1953; Kempton, 1963; Hackett and Hughes, 1965; Larsen and Lund, 1965; Lund, 1965a, 1965b, 1966a, 1966b; Piskin and Bergstrom, 1967; Landon and Kempton, 1971).

As the glacial deposits immediately underlie the Modern Soil in most of the Chicago area, mapping of these deposits is of major importance in environmental geology. The surficial geology map (pl. 1) shows as many map units as it was practical to map on that scale. To bring out major changes in composition and the principal geologic features, several types of units are mapped. Most of the map units are rock-stratigraphic and morphostratigraphic units, but some show important relations, such as thin till on sand and gravel. Other map units are surfaces, such as lake plains and shorelines that have local lacustrine deposits and, also, glacial sluiceways that have local deposits of sand and gravel. The major units are shown on the glacial map (fig. 16).

The principal general reports on the Pleistocene stratigraphy of the Chicago area are by Leverett (1897); Goldthwait (1909); Trowbridge (1912); Culver (1922); Fisher (1925, 1928); and Bretz (1939, 1955). Other reports that deal in part with the Chicago area are by Leverett (1899); Ekblaw and Athy (1925); Leighton (1925); Fryxell (1927); Powers and Ekblaw (1940); Ekblaw (1959); Willman, Glass, and Frye (1963); Frye, Willman, and Black (1965); Kempton and Hackett (1968); Hackett and McComas (1969); and Willman and Frye (1970). The history of Lake Chicago has been discussed in many reports, including those by Leverett and Taylor (1915); Bretz (1939, 1951, 1955, 1964, 1966); Hough (1958, 1963, 1966); and Wayne and Zumberge (1965). The following discussion of the stratigraphy and geologic history of the Pleistocene is based largely on these and other reports.

The classifications of the Pleistocene deposits used in this report are those introduced for Illinois by Willman and Frye (1970).

Illinoian Stage

Illinoian drift 25 to 50 feet thick probably covered the Chicago area at the beginning of Wisconsinan glaciation, but it was eroded and no Illinoian drift has been definitely identified in the area. Patches of Illinoian drift may remain in protected localities, particularly in the western parts of McHenry and Kane Counties.

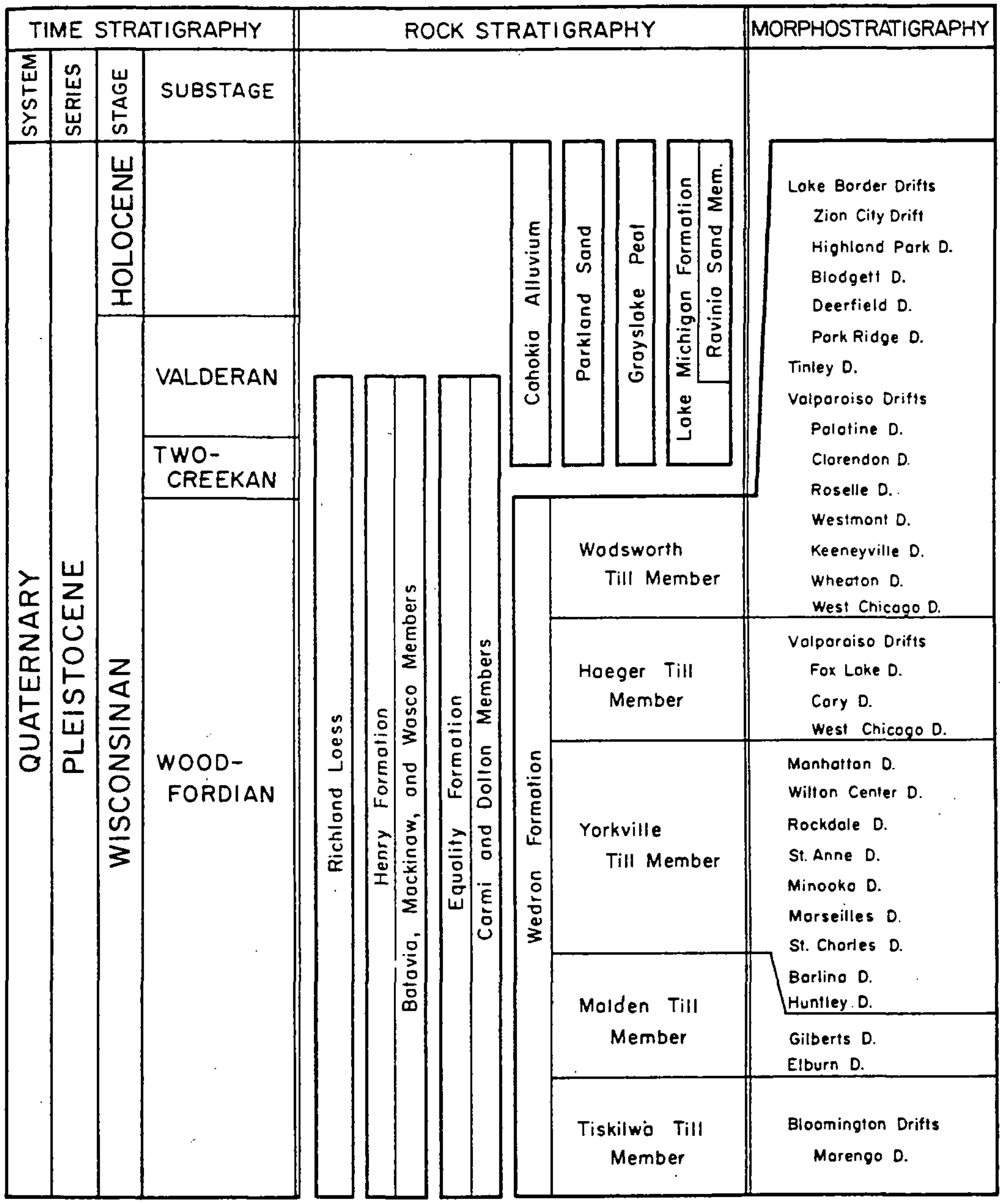


Fig. 15 - Classification of the Pleistocene rocks of the Chicago area (after Willman and Frye, 1970).

Where the Sangamon Soil was eroded by the Wisconsinan glaciers, differentiation of the Illinoian and Wisconsinan tills is difficult, but it has been accomplished in the area immediately west, partly by mineral and grain-size analyses (Frye et al., 1969).

Wisconsinan Stage

The glacial deposits in the Chicago area are almost entirely Wisconsinan in age. The Wisconsinan Stage is subdivided into five substages: (1) the Altonian, which includes till and outwash buried by younger drift and is found mainly in the northwestern part of the area; (2) the Farmdalian, which includes local deposits of peat, organic silts, and lake deposits; (3) the Woodfordian, which includes most of the Wisconsinan till, outwash, and lake deposits in the area; (4) the Twocreekan, which includes local lake and swamp deposits buried in the Lake Chicago sediments; and (5) the Valderan, which includes lake deposits in a small part of the Lake Chicago plain and part of the youngest sand and gravel deposits in the Des Plaines and Illinois Valleys.

The time span of the substages in radiocarbon years before the present (B.P.) is as follows (Willman and Frye, 1970, fig. 14):

Valderan Substage	- 7,000 to 11,000
Twocreekan Substage	- 11,000 to 12,500
Woodfordian Substage	- 12,500 to 22,000
Farmdalian Substage	- 22,000 to 28,000
Altonian Substage	- 28,000 to 75,000

Radiocarbon dating cannot be used to determine the age of deposits older than the Wisconsinan, and generally not of those older than 50,000 radiocarbon years. Radiocarbon years are based on isotopic analyses and, although close, are not precisely equivalent to years based on rotation of the earth around the sun.

Altonian Substage

Winnebago Formation

The drift of the Winnebago Formation is the surface drift just west of the front of the Marengo Moraine, and in one locality it is only a mile west of the Chicago area (pl. 1) (Frye et al., 1969). In the northwestern part of the area, the Winnebago Formation is widely present below the Marengo and younger drifts. It is exposed in a local area too small to show on plate 1 along Big Rock Creek 3½ miles northeast of Plano on the Kane-Kendall County line (Yorkville Quad.), where two pinkish gray, silty, sandy tills are separated by a bed of silt, called the Plano Silt Member (Kempton and Hackett, 1968). The silt has been found in several borings, and peat from it has been dated at 32,600 to 41,000 radiocarbon years B. P.

In the lower parts of the bluffs, along the Des Plaines Valley from Summit to Romeo (3 miles west of Lemont) and along the Sag Channel from Worth to Sag Bridge, many exposures of yellow, silty till are associated with lenticular bodies of poorly sorted gravel and sand and cross-bedded sand and silt. These deposits are informally called the Lemont drift (Bretz, 1955; Horberg and Potter, 1955; Willman and Frye, 1970). They may be part of the Winnebago Formation. Their age is uncertain and they have been variously correlated with Illinoian, Altonian, and Woodfordian deposits. They appear to have been eroded and weathered before they were covered by Valparaiso Drift.

Farmdalian Substage

Robein Silt

Peat and organic silt deposits overlying the Winnebago Formation and underlying the Wedron Formation are assigned to the Robein Silt Formation. They were previously called Farmdale Silt. They have been encountered in borings along the Northwest Toll Road and elsewhere in the northwestern part of the area (Kempton, 1963; Kempton and Hackett, 1968). Dates of 23,000 to 26,000 radiocarbon years B.P. were obtained from the peat.

A waterlaid silt overlain by pink till of the Tiskilwa Member is exposed by a roadcut through the Cryder Lake beach escarpment 1 mile north of Morris (Morris

Quad.) and has been dated at 24,000 radiocarbon years B.P. It indicates that a lake was present in the Illinois Valley region in Farmdalian time.

Woodfordian Substage

Wedron Formation

The Wedron Formation includes all the glacial drift from the base of the oldest till overlying the Winnebago or Robein Formations to the top of the youngest till in the region (Frye et al., 1968). The Wedron Formation is the surface drift in a large part of the Chicago area (pl. 1), although it commonly has a thin cover of the Richland Loess and the Modern Soil, which are not shown on plate 1. In extensive areas the Wedron Formation is overlain by the Henry, Equality, Parkland, Grayslake, or Cahokia Formations, which do appear on plate 1. In Lake Michigan the Wedron is overlain by the Lake Michigan Formation. The Wedron Formation averages 100 feet thick throughout the area, and it is as much as 300 feet thick in some buried valleys and in the higher moraines. It is dominantly till that occurs in sheet-like deposits separated by beds of waterlaid sand, gravel, or silt. Many of the tills have a distinctive texture or color, can be traced widely, and are differentiated as members (Willman and Frye, 1970).

Tiskilwa Till Member - The oldest of the Woodfordian till members identified in the Chicago area is a distinctive sandy pink till that is called the Tiskilwa Till Member of the Wedron Formation. It is the surface drift in the Chicago area only in the Marengo Moraine, which occurs along the west side of the area west of Elgin (Pinegree Grove Quad.). The member is exposed in many roadcuts in the Marengo Moraine and in roadcuts a mile northwest of Algonquin (Crystal Lake Quad.), where it is overlain by younger drift. It is encountered in wells throughout the northwestern part of the map area. South of the Marengo Moraine, the Tiskilwa Till Member is generally buried by younger drift, but it is exposed in roadcuts near Morris and Joliet.

Malden Till Member - The Malden Till Member is characterized by yellow-gray or pinkish gray silty till and is the surface drift in the area between the Marengo Moraine, which consists of pink sandy till of the Tiskilwa Till Member, and the Huntley and St. Charles Moraines, which consist of gray clayey till of the Yorkville Till Member. In the area of the Gilberts Drift the Malden Till incorporated enough of the Tiskilwa Till to give it a pinkish cast in many exposures. It varies from pinkish gray to yellow-gray and generally is very silty. Farther south in the area of the Elburn Drift, the Malden Till Member is largely yellow-gray silty till.

Yorkville Till Member - The Yorkville Till Member is characteristically gray clayey till, generally with few cobbles and boulders but with abundant small pebbles. It is the surface drift in the area between the Gilberts Drift or the Elburn Drift and the front of the Valparaiso Morainic System, and it includes the tills of eight moraines (fig. 16). To show the overlapping relations of the moraines, the Yorkville Member is differentiated on the geologic map (pl. 1) into two units at the front of the Minooka Moraine. The till in the older moraines (Huntley, Barlina, St. Charles, Marseilles, and Minooka) is slightly more clayey and is darker in color than the till in the younger moraines (Rockdale, Wilton Center, Manhattan). It also is characterized on weathered surfaces by a concentration of small pebbles that give it the appearance of gravel (fig. 17B), but this is readily disproved by slight digging.

Fig. 17 - Exposures of Pleistocene deposits

A - Glacial till showing the characteristic lack of sorting in a mixture of pebbles, sand, silt, and clay. Haeger Till Member of Wedron Formation, exposed at the top of a gravel pit 1 mile south of Spring Grove (Fox Lake Quad.).

B - Comparison of weathered surface of Yorkville Till Member of Wedron Formation, which characteristically has a concentration of small angular pebbles (left of pencil), with a freshly scraped surface of the till (right). Road cut at intersection of Illinois Highways 47 and 71, 1 mile south of Yorkville (Platteville Quad.).

C - Poorly sorted gravel in Wasco Member of Henry Formation in gravel pit in the Kaneville Esker 3 miles northwest of Sugar Grove (Sugar Grove Quad.).

D - Well sorted gravel in Batavia Member of Henry Formation, in gravel pit 3 miles northeast of Spring Grove (Fox Lake Quad.).

E - Thin Richland Loess overlying Yorkville Till Member of the Wedron Formation 1 mile south of Yorkville. The loess is clayey silt about 1 foot thick and has a sharp contact with the pebbly till below, at the head of the hammer.

F - Poorly sorted gravel in steeply dipping fore-set beds of an ice-front delta in Wasco Member of Henry Formation. Small gravel pit on the Rockdale Moraine on the north side of Romeoville (Romeoville Quad.).

Haeger Till Member - The Haeger Till Member consists of yellow-gray, sandy or gravelly, silty till that occurs in the Valparaiso Morainic System in the westward bulge of the moraines north and west of Algonquin (figs. 16 and 17A) and along the front of the system southward, nearly to West Chicago (West Chicago Quad.). It is strikingly different from the Yorkville, Malden, and Tiskilwa Till Members, which it overlaps to the northwest. Along its east margin it is more clayey and is differentiated from the Wadsworth Till Member largely by its abundant gravel lenses and associated kames and eskers.

Wadsworth Till Member - The Wadsworth Till Member consists mostly of gray clayey till. It is the surface till in the Valparaiso Morainic System, the Tinley Moraine, and the Lake Border Morainic System, except in the northwestern part of the Valparaiso Morainic System where the gravelly till is differentiated as the Haeger Till Member. South of the area of the Haeger Till Member, the Wadsworth Till is not conspicuously different from the clayey till of the Yorkville Till Member that borders it on the west and south. However, the till in the West Chicago Moraine, the outermost of the Valparaiso Moraines, is slightly lighter in color, more silty, and contains more gravel lenses than the Yorkville till. The tills of the Lake Border Moraines, particularly in the area of Lake Chicago, have fewer pebbles, cobbles, and boulders than the older drifts. The Wadsworth Till contains an abundance of black shale from Mississippian and Devonian formations, both as pebbles and as finely ground particles in the matrix. The till in the Tinley Moraine has a particularly high content of black shale.

Morphostratigraphic Units

The deposits of the Woodfordian glaciers are also classified into morphostratigraphic units, called drifts, each of which consists of all the deposits related to the pulse of the ice front that produced a moraine. Each unit may contain parts of all of the formations of Woodfordian age except the Richland Loess. Each drift is named for the moraine on which it is based.

The Chicago area contains 27 named moraines (fig. 15). Nine of these are closely related moraines that form the Valparaiso Morainic System, and five make up the Lake Border Morainic System. Several of the named moraines may be contemporaneous. For example, the St. Charles and Marseilles Moraines are thought to be equivalent to the Huntley and Barlina Moraines. However, at least 19 stands of the ice front are required to account for the moraines in the Chicago area.

The moraines are grouped into seven map units on plate 1, but the boundaries of the individual moraines are shown and the units identified by different symbols. The individual moraines are all mapped and named in figure 16. The moraine map shows only the moraines on which the drifts are based, not the entire area covered by the drifts. The drifts are described below in units corresponding to those shown on plate 1.

Marengo Drift - The Marengo Drift is related to the Marengo Moraine, the oldest moraine in the area, the front of which lies west of the area. The moraine is one of the most prominent in the state. Its crest is locally as much as 200 feet above the outwash plain along its front. The drift is dominantly pink sandy till, but small kames and closed depressions that contain silt and peat are common on the surface. It is exposed in roadcuts in the Pingree Grove Quadrangle.

Gilberts and Elburn Drifts - The Gilberts Drift occurs in a rough, morainic area consisting of knobs, kettles, kames, eskers, and lake plains. Probably half of the deposits in the Gilberts Drift are waterlaid. The till is largely pinkish gray or yellow-gray. The Gilberts Drift was deposited by a glacier that advanced onto the back slope of the Marengo Moraine.

The Elburn Drift is probably contemporaneous with the Gilberts, but the till is yellow-gray and silty and it lacks the pinkish color common in the Gilberts till. The drift occurs in an irregular area mapped as the Elburn Complex because it consists of discontinuous, variously oriented, morainic ridges separated by pitted outwash, kames, eskers, and lake plains. The Kaneville Esker (Sugar Grove Quad.) is a prominent feature 6 miles long and 50 feet high, except where sand and gravel has been removed (Lukert and Winters, 1965).

St. Charles to Barlina Drifts - The St. Charles, Marseilles, Huntley, and Barlina Drifts are related to moraines that consist largely of gray clayey till. The Marseilles is one of the more prominent moraines in the state, but the other three are low, weakly morainic ridges. Outwash plains are abundant along the front of the Marseilles Moraine. The St. Charles Moraine is well developed immediately west of St. Charles in the Geneva Quadrangle. The Marseilles Moraine is prominent in the Platteville Quadrangle, and the Huntley and Barlina Moraines are distinct ridges in the Huntley Quadrangle.

Minooka to Manhattan Drifts - The Minooka, Rockdale, Wilton Center, and Manhattan Drifts are all related to moraines that are dominantly gray clayey till that is locally silty. The till is similar to, but generally less pebbly than, the Marseilles till. The Minooka is the most prominent of the moraines, and it overrides the Marseilles Moraine at right angles south of Aurora (Aurora South Quad.). These moraines have a low surface relief, and little outwash is associated with them. The Minooka Moraine is most prominently developed in the Aurora South and Yorkville Southeast Quadrangles, the Rockdale Moraine in the Plainfield and Joliet Quadrangles, and the Manhattan Moraine in the Manhattan Quadrangle.

Valparaiso Drifts - The nine moraines differentiated in the Valparaiso Moranic System (fig. 16) are closely spaced and appear to represent minor pulses of the ice front or perhaps only brief stands during the retreat. The boundaries between the moraines are indefinite in many places, and they have not been traced through the northeastern part of the area, which is mapped as undifferentiated Valparaiso. Only the West Chicago Moraine at the front of the morainic system is continuous. Because of uncertain correlations, some of the moraines that may be contemporaneous are given different names in different areas. The Cary Moraine is probably equivalent to the Wheaton, and the Palatine to the Clarendon.

The topography of the Valparaiso moraines is rough. Knobs, kettles, swamps, and lakes are particularly large and abundant in the northern part of the area. The area around Fox Lake is typical (Fox Lake and Antioch Quads.). The topography is more subdued and lakes are much less common in the southern part, where the area near Beecher is typical (Beecher East and Beecher West Quads.). The West Chicago Drift includes extensive outwash plains along the front of the moraine from Joliet northward. From Elgin northwestward the till is thin, overlies an extensive deposit of sand and gravel, and is mapped as thin till on gravel (pl. 1). In that area the till is yellow-gray, silty, and gravelly, whereas elsewhere it is mostly gray to light brownish gray clayey till. Prominent terraces of sand and gravel are traceable from the front of the morainic system down the Fox, Du Page, and Des Plaines Valleys.

Tinley Drift - The Tinley Drift is largely gray clayey till related to the Tinley Moraine. It represents a readvance of the ice onto the back slope of the Valparaiso Morainic System. The Tinley Moraine has a rough topography similar to that of the Valparaiso. Lake silts and clays as much as 20 feet thick accumulated in lakes along the front of the moraine (fig. 16). The Tinley Moraine is well developed in the Tinley Park Quadrangle.

Lake Border Drifts - The Lake Border Morainic System is well developed in the area north of Chicago (fig. 16). It consists of five moraines that are separated throughout much of their length by parallel valleys — the Des Plaines Valley and the valleys of tributaries of the Chicago River. Except near the Wisconsin state line, the Lake Border Moraines are much better defined than the moraines in the Valparaiso Morainic

System. The drift in all the moraines is a gray clayey till similar to that in most of the Valparaiso Moraines. The moraines have much less relief and gentler slopes than the Valparaiso Moraines. Kames, eskers, and lakes are scarce. Lake Border outwash consisting of fine sandy gravel was deposited along the Des Plaines Valley from its point of discharge into Lake Chicago northward to the state line (pl. 1). The four principal moraines in the system are well shown on the Highland Park Quadrangle, and the small patches of the Zion City Moraine are best shown on the Waukegan Quadrangle.

Woodfordian-Valderan Substages

Several of the formations that are dominantly Woodfordian in age continued to receive sediments through Twocreekan and Valderan time. These include the Henry Formation, a minor amount of which was deposited by the Chicago Outlet River during its discharge from Lake Algonquin of Valderan age. The Henry Formation may also include deposits made by the discharge from the Holocene lakes (Nipissing and Algoma), but it is more likely that these deposits are included in the Cahokia Alluvium. The Equality Formation likewise contains a small proportion of sediments that accumulated in Lake Algonquin and possibly in the Holocene lakes. The Richland Loess probably contains a small amount of wind-blown silt from Valderan outwash but very little has been added since then.

Henry Formation

The Henry Formation is glacial outwash, dominantly sand and gravel, that directly underlies the Modern Soil or the Richland Loess (Willman and Frye, 1970). In places the formation is overlain by Wisconsinan-Holocene formations. Sand and gravel outwash that underlies or is interbedded with till is included in the Wedron Formation.

The Henry Formation is subdivided into three members, the Wasco, Batavia, and Mackinaw Members, based on general differences in composition and sorting. The mapping of the members is based largely on topographic expression. They grade into each other in places, but in the stratigraphic classification they are never superimposed and are separated by a vertical cut-off. In addition to the extensive areas shown on plate 1, there are a great many areas of the Henry Formation too small to map. The formation is exposed in numerous gravel pits and roadcuts.

<u>Wasco Member</u> - The Wasco Member consists of sand and gravel deposited in or bordering the glaciers, most of it in kames, kame terraces, eskers, and deltas. These ice-contact deposits commonly contain lenses of till and silt, vary greatly in grain size and degree of sorting, and commonly have steeply dipping beds. The Wasco Member is exposed in numerous gravel pits, particularly near Wasco (Elburn Quad.) and in the Kaneville Esker (Sugar Grove Quad.).

<u>Batavia Member</u> - The Batavia Member consists of sand and gravel deposits in outwash plains, most of them along the front of the moraines. Those deposits close to the moraines have the poor sorting of the ice-contact deposits, but they do not have the disturbed bedding or the till content. The deposits of the Batavia Member are generally cross-bedded and become noticeably finer grained away from the moraine. They are upland deposits, but in some places they can be traced into valleys where they grade into the Mackinaw Member. Outwash plains are extensive along the front of the West Chicago Moraine north from Naperville, and the deposits are exposed in many gravel pits, particularly near Elgin and Crystal Lake (West Chicago, Elgin, and Crystal Lake Quads.).

<u>Mackinaw Member</u> - The Mackinaw Member consists of sand and gravel deposited by glacial rivers in the valleys. These deposits are generally better sorted, more evenly bedded, and more uniform in grain size than those of the other members. Because of repeated episodes of gravel deposition and erosion, the Mackinaw Mem-

ber in some valleys consists of remnants of terraces at several levels. It also includes deposits by the outlet rivers of glacial lakes because these are similar in composition to the deposits of the glacial rivers. The Mackinaw Member is widely present in terraces along the Fox, Du Page, and Des Plaines Valleys, and typical exposures occur in gravel pits near Elgin, Plainfield, and Channahon (Elgin, Geneva, Normantown, Plainfield, and Channahon Quads.).

Equality Formation

The Equality Formation is composed of silt, sand, gravel, and clay deposits that accumulated in glacial lakes (Willman and Frye, 1970). It is generally overlain only by the thin Richland Loess or the Modern Soil, but in places it is overlain by the Wisconsinan-Holocene formations. In many of the areas mapped as Grayslake Peat, the Equality Formation underlies the peat and represents the initial filling of the lake basin immediately following the melting of the ice.

The Equality Formation is subdivided into two members — the Carmi Member, which is dominantly silt and clay, and the Dolton Member, which is dominantly sand and gravel. The members grade laterally into each other but are not superimposed. Although generally separable by a vertical cut-off in the gradational zone, members are not differentiated in areas where repeated lateral changes in composition occur or where the proportions of sand and silt are roughly equal.

The Equality Formation is almost continuously present in the areas mapped as Equality on plate 1, is common in patches throughout the areas mapped as lake plain, and is present at many places on the moraines in areas too small to map. The lake plains are flat, and the deposits are seldom exposed.

Carmi Member - The Carmi Member of the Equality Formation is dominantly silt, generally well bedded or laminated. Much of it is sandy, and it contains beds of fine sand and clay. In most of the lake basins these deposits are only a few feet thick, rarely as much as 20 feet thick. They underlie the flat areas of the lake basins and are the deeper water deposits. In the Chicago area they are exposed at the top of clay pits near Blue Island and Dolton (Blue Island and Lake Calumet Quads.).

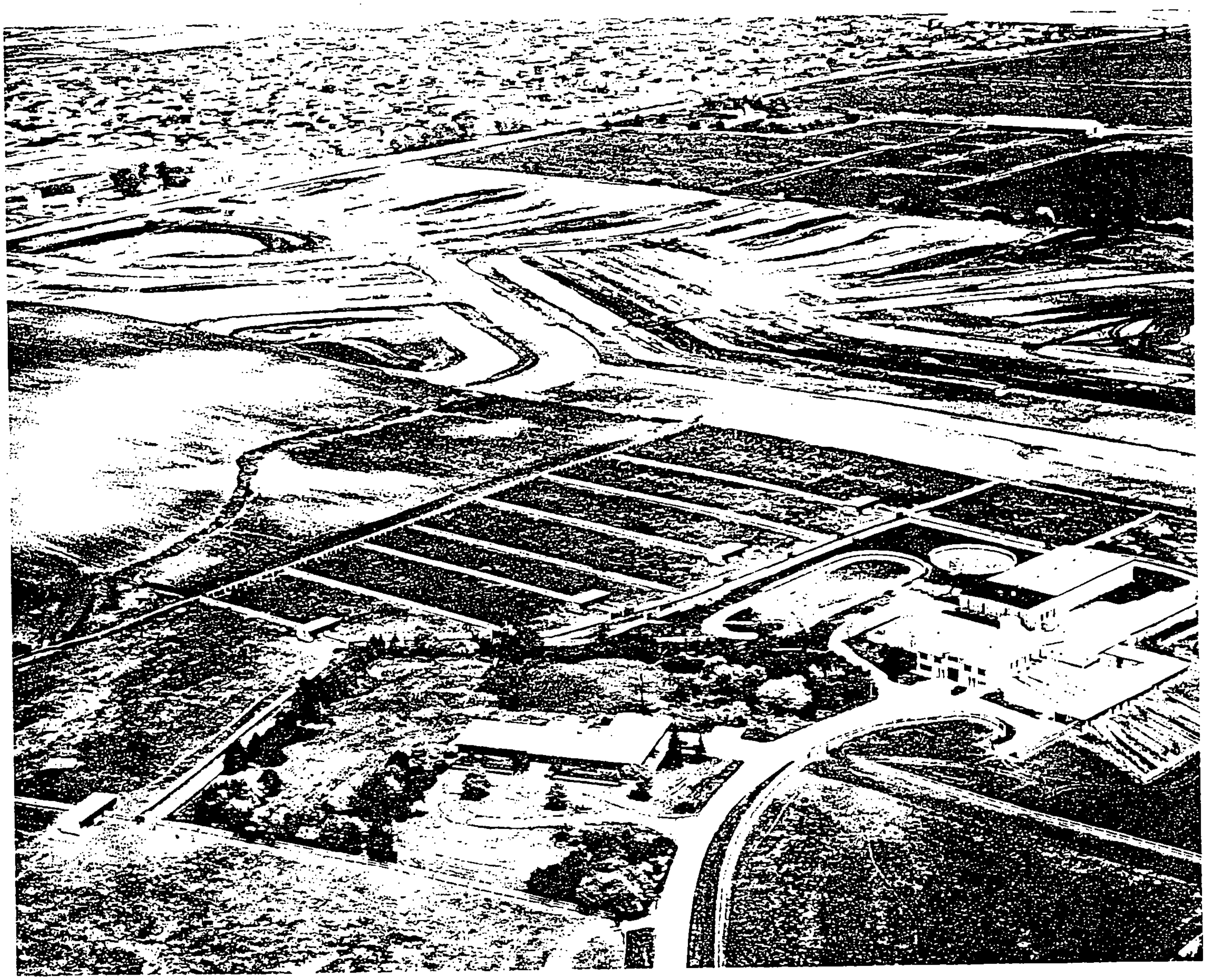
Dolton Member - The Dolton Member of the Equality Formation is dominantly sand, but it contains beds of silt, pebbly sand, and gravel. The deposits are generally less than 10 feet thick, but in some of the more prominent spits they are as much as 25 feet thick. The Dolton Member consists of shore and shallow-water lake deposits, and it commonly occurs in low ridges that were beaches, bars, and spits. Pebbly sand and gravel is largely confined to narrow belts along the more prominent shorelines where waves eroded the till, washed away the silt and clay, and left a concentrate of sand and pebbles. The Dolton Member is exposed in sand pits in the Toleston beach at Dolton (Lake Calumet Quadrangle), in the Glenwood spit east of Chicago Heights (Calumet City Quad.), and in the Wilmette spit southwest of Wilmette (Evanston Quad.).

Richland Loess

The Richland Loess is a thin deposit of wind-blown silt that overlies the glacial drift (Wascher et al., 1960, fig. 9; Willman and Frye, 1970, pl. 3). The loess mantled the Chicago area soon after the glaciers melted, but much of it was washed by rains into the valleys and deposited in the Cahokia Alluvium. It is now present only on the flatter, uneroded upland areas. It is a fine-grained, clayey silt distinguished from the till below by much better sorting, lower clay content, and the absence of pebbles, except for a few probably mixed into it by burrowing animals (fig. 17E).

Because most of the loess in the Chicago area was blown from the Illinois and Mississippi Valleys during Woodfordian glaciation, it is thicker on the older drift in the western part of the area, where it started accumulating while the ice was still present in the area of the younger drift. The loess is 2 to 4 feet thick on the Mar-

SOIL SURVEY OF
DU PAGE AND PART OF COOK COUNTIES, ILLINOIS



UNITED STATES DEPARTMENT OF AGRICULTURE,
SOIL CONSERVATION SERVICE,
in cooperation with
ILLINOIS AGRICULTURAL EXPERIMENT STATION

The areas shown on the soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land-use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, home-buyers, and those seeking recreation.

General soil map for broad land-use planning

The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each map unit is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of urban development or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

The map units shown on the general soil map have been placed in four major groups for broad interpretative purposes. The groups are separated by texture of the surface layer and by landscape position. Each of the major groups and their included soils are described on the following pages.

Silty and clayey soils on uplands and lake plains

This group consists of five map units, and it makes up about 2 percent of the survey area. The major soils in this group are the Markham, Ashkum, Morley, Frankfort, Bryce, and Milford soils. Most areas of these soils are undulating to gently rolling, but areas range from very steep to nearly level. These soils are on uplands and lake plains. They have a clayey or silty surface layer and a clayey or silty subsoil. They are poorly drained to well drained and are moderately slowly permeable or slowly permeable.

More than half of the map units in this group consist of heavily built-up, expanding, metropolitan, and rural-urban areas. Many areas of soils have been cut, graded, and filled and are covered with dwellings, shopping centers, industrial sites, office buildings, pavement, and other works and structures.

Most soils in this group were used for crops or pasture at one time. Some areas are still used for crops, mainly corn and soybeans. A few areas, however, are in vegetable farms. Woodland remains in some places, especially along the major streams and drainageways.

About one-third of the soils in this group have fair potential for most urban uses, and the rest have poor potential. The main concern in management is poor drainage in the low lying areas. Generally, the soils are poorly suited to septic tank filter fields. In the low lying areas, dwellings with basements are poorly suited.

1. Frankfort-Bryce

Deep, gently rolling to nearly level, somewhat poorly drained and poorly drained soils that have a clayey subsoil; formed in glacial till

This map unit consists of gently rolling and nearly level soils on glacial moraines and till plains in the northern and southern parts of Cook County.

This unit makes up about 2 percent of the survey area. It is about 55 percent Frankfort soils, 20 percent Bryce soils, and 25 percent soils of minor extent.

The Frankfort soils in most places are at a slightly higher elevation than the Bryce soils. Frankfort soils are somewhat poorly drained, and Bryce soils are poorly drained. Frankfort soils have a surface layer of silty clay loam or silty clay, and Bryce soils have a surface layer of silty clay. Both soils have low strength when wet.

The minor soils in this unit are the very poorly drained Muskego and Houghton soils, the somewhat poorly drained Nappanee and Swygert soils, and the strongly sloping Chatsworth soils. The very poorly drained Muskego and Houghton soils are unstable organic soils.

Areas of this unit are used mainly for farming, for private estates, or for homes with relatively large lots. A large percentage of the areas is in idle farmland, vacant land, or forest preserves. Wetness and the high content of clay are the main limitations to urban development and to most other uses. Occasional flooding is a limitation in low lying areas. Erosion is a limitation in some of the more rolling areas. Severely eroded areas are difficult to vegetate.

Wetness and the high content of clay are severe limitations that are difficult to overcome. Hence, the potential for most urban uses is poor. Even when the soils are drained, potential for farming is only fair. Low lying areas have good potential for development of wetland wildlife habitat.

2. Morley-Ashkum

Deep, very steep to nearly level, well drained and poorly drained soils that have a clayey and silty subsoil; formed in glacial till

This map unit consists of very steep to nearly level soils. Commonly, the gently rolling to nearly level soils are on till plains or moraines and are mainly along the major watercourses throughout the county. The moderately sloping to very steep soils are mostly in deep ravines and on escarpments along Lake Michigan, the Des Plaines River, and the Calumet-Sag Channel.

This unit makes up about 12 percent of the survey area. It is about 50 percent Morley soils, 20 percent Ashkum soils, and 30 percent soils of minor extent.

The Morley soils are at a higher elevation than the Ashkum soils. Morley soils are well drained, and Ashkum soils are poorly drained. Morley soils have a surface layer of silt loam, except for the severely eroded areas. Ashkum soils have a surface layer of silty clay loam or silty clay. Both soils have fair to poor strength when wet.

The minor soils in this unit are the very poorly drained, unstable Muskego and Houghton soils, the somewhat poorly drained Beecher and Blount soils, and the moderately well drained Markham soils.

The pattern of land use in this map unit is mixed. Areas are in tracts of idle land, farmland, and small estates. A relatively high percentage of the areas is in trees and forest preserves. Some areas of the minor soils are swampy and undrained. The clayey subsoil and wetness are the main limitations for urban development and for most other uses. Slope is a limitation on steep areas.

The Morley soils in this unit have fair potential for most urban uses. The very steep areas have poor potential for most uses because of slope. The low lying areas have poor potential for urban development because of wetness. The potential for development of wetland wildlife habitat is good.

3. Markham-Ashkum

Deep, gently rolling to nearly level, moderately well drained and poorly drained soils that have a clayey and silty subsoil; formed in glacial till

This map unit consists of soils on till plains and moraines. These soils commonly are throughout the survey area, except in the extreme western part and on the lake plain bordering Lake Michigan.

This unit makes up about 15 percent of the survey area. It is about 50 percent Markham soils, 25 percent Ashkum soils, and 25 percent soils of minor extent.

The Markham soils are at a higher elevation than the Ashkum soils. Markham soils are moderately well drained, and Ashkum soils are poorly drained. Markham soils have a surface layer of silt loam and are susceptible to erosion. Ashkum soils have a surface layer of silty clay loam or silty clay. Both soils have fair to poor strength when wet.

The minor soils in this unit are the very poorly drained, unstable Muskego and Houghton soils, the somewhat poorly drained Elliott and Beecher soils, and the well drained Varna soils.

The pattern of land use in this map unit is mixed. Many areas are in farms, and many areas of farmland are idle. Areas are also in small rural estates, homesites with relatively large lots, and forest preserves. A few areas are swampy and undrained. The relatively high clay content and wetness are the main limitations to urban development and to most other uses. Occasional brief flooding is a hazard on some low lying areas.

The Markham soils have fair potential for urban development. They are subject to severe erosion if left without plant cover for a considerable period. Wetness is a severe limitation on Ashkum soils and is difficult to overcome. Hence, the potential for most urban development is poor. The potential for development of wetland wildlife habitat is good.

4. Milford-Martinton

Deep, nearly level, poorly drained and somewhat poorly drained soils that have a silty and clayey subsoil; formed in glacial lake sediment

This map unit consists of nearly level soils that are on lake plains and are generally lower than the surrounding soils. Most areas of this map unit are next to Lake Michigan and are not built up. Smaller areas are scattered throughout the survey area.

This unit makes up about 2 percent of the survey area. It is about 60 percent Milford soils, 25 percent Martinton soils, and 15 percent soils of minor extent.

The Milford soils in most places are at a slightly lower elevation than the Martinton soils. Milford soils are poorly drained, and Martinton soils are somewhat poorly drained. Milford soils have a surface layer of silty clay loam, whereas Martinton soils have a surface layer of silt loam. Both soils have medium to low compressibility when wet.

The minor soils in this unit are the somewhat poorly drained Del Rey and Hoopeston soils, the poorly drained Selma and Gilford soils, and the well drained Oakville soils.

Much of the acreage of this unit is farmed. A large area in southeastern Cook County is used for vegetable production. A large acreage of this unit is in idle farmland, small estates, and homesites with relatively large lots. Wetness and the high content of clay are the main limitations for urban development and for most other uses.

Wetness is a severe limitation that is difficult to overcome. Because of wetness the potential for most urban development is poor. The potentials for cultivated farm crops and for development of wetland wildlife habitat are good.

5. Urban land-Frankfort-Bryce

Built-up areas and deep, gently rolling to nearly level, somewhat poorly drained and poorly drained soils that have a clayey subsoil; formed in glacial till

This map unit consists of built-up areas and of gently rolling to nearly level soils on glacial moraines and till plains on uplands. Areas of this unit are in built-up parts of Cook County.

This unit makes up about 3 percent of the survey area. It is about 40 percent Urban land, 30 percent Frankfort soils, 20 percent Bryce soils, and 10 percent soils of minor extent.

The Urban land consists of works and structures that obscure or alter the soils. In most areas the Frankfort soils are at a slightly higher elevation than the Bryce soils. Frankfort soils are somewhat poorly drained and have a surface layer of silty clay loam or silty clay. Bryce soils are poorly drained and have a surface layer of silty clay. Both soils have low strength when wet.

The minor soils in this unit are the altered Orthents, clayey, the very poorly drained Peotone soils, and the somewhat poorly drained Nappanee and Swygert soils.

This unit is predominantly used for urban development. Unaltered soils are in vacant lots or in developments that have relatively large lots. Wetness and the high content of clay are the main limitations to urban development and most other uses. Occasional flooding is a limitation in low areas. Basements are likely to be wet in low areas, and septic tank filter fields are likely to function poorly. Erosion is a limitation in some of the more rolling areas. Severely eroded areas are difficult to vegetate.

6. Urban land-Markham-Ashkum

Built-up areas and deep, gently rolling to nearly level, moderately well drained and poorly drained soils that have a clayey and silty subsoil; formed in glacial till

This map unit consists of built-up areas and of gently rolling to nearly level soils on till plains and moraines on uplands. Most areas of this unit are in the outer suburbs of Chicago.

This unit makes up about 21 percent of the survey area. It is about 40 percent Urban land, 30 percent Markham soils, 15 percent Ashkum soils, and 15 percent soils of minor extent.

The Urban land consists of works and structures that obscure or alter the soils. The Markham soils are at a higher elevation than the Ashkum soils. Markham soils are moderately well drained, and Ashkum soils are poorly drained. Markham soils have a surface layer of silt loam and are susceptible to erosion if plant cover is removed. Ashkum soils have a surface layer of silty clay loam or silty clay and a seasonal high water table. Both soils have fair to poor strength when wet.

The minor soils in this unit are Orthents clayey, the very poorly drained, unstable Muskego and Houghton soils, the somewhat poorly drained Elliott and Beecher soils, and the well drained Morley and Varna soils.

This unit is used predominantly for urban development. A few areas of unaltered soils are in small estates and homesites with relatively large lots. The high content of clay and wetness are the main limitations to urban development and most other uses. Occasional brief flooding is a hazard in some low lying areas. Basements are likely to be wet in low areas. Septic tank filter fields are likely to function poorly in all areas of this unit.

The potential for urban development in areas of the Markham soil is fair. In areas of Ashkum soils, wetness is a severe limitation and is difficult to overcome. Hence, the potential for most urban development is poor. The potential for gardening in this unit is fair to good. Trees to plant generally are those that tolerate wetness.

7. Urban land-Milford

Built-up areas and deep, nearly level, poorly drained soils that have a silty and clayey subsoil; formed in glacial lake sediment

This map unit consists of built-up areas and nearly level soils that generally are flatter and lower than the surrounding land. Areas of this map unit are only in Cook County, mainly on the plain next to Lake Michigan.

This unit makes up about 17 percent of the survey area. It is about 50 percent Urban land, 30 percent Milford soils, and 20 percent soils of minor extent.

The Urban land consists of works and structures that obscure or alter the soils. The Milford soils are poorly drained and have a surface layer of silty clay loam. They and chroma of 2 to 4. It has ped exteriors that have ue of 3 to 5 and chroma of 1 or 2. The B2 horizon is silty clay or heavy silty clay loam and commonly contains 40 to 45 percent clay in the upper part. It is neutral to moderately alkaline in the lower part. The C horizon is predominantly silty clay loam but includes clay loam. It has strong or violent effervescence and is mildly or moderately alkaline.

Bryce series

The Bryce series consists of deep, poorly drained, slowly permeable soils in low lying areas of till plains and moraines on uplands. These soils formed in clayey sediments from surrounding slopes and glacial till. Slope ranges from 0 to 3 percent.

Bryce soils are similar to Ashkum soils and are commonly adjacent to Frankfort, Nappanee, and Swygert soils in the landscape. Ashkum soils contain less clay throughout the profile. Frankfort, Nappanee, and Swygert soils are somewhat poorly drained and are at a higher elevation. Frankfort and Nappanee soils do not have a mollic epipedon. In addition, Nappanee soils have an A1 horizon less than 5 inches thick or an Ap horizon that has value of more than 3.

Typical pedon of Bryce silty clay, in an idle field about 2 miles south of the village of Orland Park, in Cook County, 1,400 feet south and 60 feet west of the northst corner sec. 21, T. 36 N., R. 12 E:

Ap—0 to 10 inches; black (10YR 2/1) light silty clay; weak very fine granular structure; firm; neutral; abrupt smooth boundary.

A12—10 to 17 inches; black (N 2/0) silty clay; strong medium granular structure; very firm; neutral; clear smooth boundary.

B1—17 to 23 inches; very dark gray (10YR 3/1) heavy silty clay; few fine distinct olive brown (2.5Y 4/4) mottles; weak medium prismatic structure parting to strong fine angular blocky; very firm; many black (10YR 2/1) krotovinas; many black (10YR 2/1) organic coatings on faces of peds; mildly alkaline; clear smooth boundary.

B22g—23 to 32 inches; mixed gray (5Y 5/1) and yellowish brown (10YR 5/6) silty clay; many medium distinct light olive brown (2.5Y 5/4) mottles; moderate medium prismatic structure parting to strong medium angular blocky; very firm; many black (10YR 2/1) krotovinas; common moderately thick dark gray (5Y 4/1) coatings on faces of peds; few fine pebbles and shale fragments; mildly alkaline; clear smooth boundary.

B3g—32 to 48 inches; mixed grayish brown (2.5Y 5/2) and gray (5Y 5/1) silty clay; many medium and coarse distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium and coarse angular blocky; very firm; many black (10YR 2/1) krotovinas; common black (10YR 2/1) and very dark gray (10YR 3/1) coatings on vertical faces of peds; few fine pebbles and shale fragments; weak effervescence; mildly alkaline; gradual wavy boundary.

Cg—48 to 60 inches; mixed grayish brown (2.5Y 5/2) and gray (5Y 5/1) silty clay; many medium and coarse distinct yellowish brown (10YR 5/6) mottles; massive; very firm; few fine pebbles and shale fragments; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 36 to 51 inches. Depth to free carbonates ranges from 32 to 47 inches and commonly is less than the thickness of the solum.

The A horizon has value of 2 or 3 and chroma of 0 or 1. It is dominantly silty clay but ranges to heavy silty clay loam. The B2g horizon is commonly medium or heavy silty clay but ranges to clay. It is an average 42 to 50 percent clay. It is neutral or mildly alkaline. The C horizon is heavy silty clay loam or silty clay. It is mildly alkaline or moderately alkaline.

Chatsworth series

The Chatsworth series consists of deep, moderately well drained, very slowly permeable soils on moraines or on side slopes of stream valleys. These soils formed in silty clay glacial till. Slope ranges from 7 to 15 percent.

Chatsworth soils are similar to Frankfort soils and are commonly adjacent to Frankfort, Nappanee, and Swygert soils in the landscape. Frankfort, Nappanee, and Swygert soils have an argillic horizon. In addition, Frankfort soils have an Ap horizon that has value of 3 or less. Swygert soils have a mollic epipedon.

Typical pedon of Chatsworth silty clay, 7 to 15 percent slopes, severely eroded, in a cultivated field about 1 mile west of the village of Tinley Park, in Cook County, 200 feet north and 1,330 feet east of the southwest corner sec. 26, T. 36 N., R. 12 E:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silty clay; moderate medium subangular blocky structure; very firm; common very fine roots; few pebbles and shale fragments; mildly alkaline; abrupt smooth boundary.

B2—6 to 18 inches; mixed dark grayish brown (2.5Y 4/2) and yellowish brown (10YR 5/4) silty clay; many fine prominent greenish gray (5G 6/1) and many fine distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium and coarse angular blocky; very firm; common thin dark grayish brown (2.5Y 4/2) clay films on faces of peds; few very fine roots; few pebbles and shale fragments; slight effervescence; mildly alkaline; gradual wavy boundary.

ll Forest Preserve, in Du Page County, 2,240 feet south and 90 feet west of center of sec. 22, T. 39 N., R. 9 E:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak fine and medium granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

A2—8 to 11 inches; brown (10YR 4/3) silt loam; weak medium platy structure; common fine roots; strongly acid; clear smooth boundary.

B1t—11 to 14 inches; dark yellowish brown (10YR 4/4) light silty clay loam; moderate fine and medium subangular blocky structure; friable; common fine roots; common thin brown (10YR 4/3) clay films on faces of peds; strongly acid; clear smooth boundary.

B21t—14 to 20 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; common fine roots; continuous thin brown (10YR 4/3) clay films on faces of peds; strongly acid; clear smooth boundary.

IIB22t—20 to 28 inches; dark yellowish brown (10YR 3/4) clay loam; moderate medium and coarse subangular blocky structure; firm; few fine roots; continuous thick dark brown (7.5YR 3/2) clay films on faces of peds; medium acid; clear wavy boundary.

IIB3—28 to 36 inches; dark yellowish brown (10YR 3/4) sandy clay loam; weak coarse subangular blocky structure; friable; very few fine roots; common moderately thick dark brown (7.5YR 3/2) clay films on faces of peds; mildly alkaline; abrupt wavy boundary.

IIIC—36 to 60 inches; dark yellowish brown (10YR 4/4) weakly stratified sand and gravel; single grain; loose; slight effervescence; moderately alkaline.

The thickness of the solum and depth to calcareous gravel and sand range from 24 to 39 inches. Thickness of the overlying silty material ranges from 14 to 20 inches.

An A1 horizon is in some pedons. It has value of 2 or 3 and chroma of 1 or 2. Some pedons do not have an A2 horizon. The B2 hoizon has hue of 10YR or 7.5YR and chroma of 3 or 4. It is predominantly silty clay loam in the upper part but ranges from silty clay loam to clay loam in the lower part. The B2 horizon is strongly acid to slightly acid in the upper part and medium acid to neutral in the lower part. The B3 horizon is clay loam or sandy clay loam. It has a high content of gravel in some pedons. It is neutral or mildly alkaline. The C horizon is dominantly gravel or stratified gravel and sand.

Frankfort series

The Frankfort series consists of deep, somewhat poorly drained, slowly permeable soils on glaciated uplands. These soils formed in silty clay glacial till. Slope ranges from 1 to 10 percent.

Frankfort soils are similar to Beecher soils and are commonly near Bryce, Nappanee, and Swygert soils in the landscape. Beecher soils contain less clay in the solum and underlying material. Bryce soils are poorly drained, and both Bryce and Swygert soils have a mollic epipedon. Nappanee soils have an ochric epipedon.

Typical pedon of Frankfort silty clay loam, 1 to 5 percent slopes, in an idle field near the village of Northbrook, in Cook County, 2,500 feet east and 1,450 feet south of the northwest corner sec. 6, T. 42 N., R. 12 E:

Ap—0 to 8 inches; very dark gray (10YR 3/1) silty clay loam, very dark grayish brown (10YR 3/2) crushed; moderate medium angular blocky structure parting to weak very fine granular; firm; a moderate content of fine and medium sand; few pebbles; slightly acid; abrupt smooth boundary.

B21t—8 to 16 inches; dark brown (10YR 4/3) heavy silty clay; dark gray (10YR 4/1) exteriors of peds; few fine distinct yellowish brown (10YR 5/6) mottles; strong medium prismatic structure parting to strong fine and medium angular blocky; very firm; many moderately thick dark gray (10YR 4/1) clay films on faces of peds; few small pebbles and shale fragments; slightly acid; clear smooth boundary.

B22t—16 to 19 inches; dark grayish brown (10YR 4/2) silty clay; common fine distinct olive gray (5Y 5/2) and many fine distinct yellowish brown (10YR 5/6) mottles; strong medium prismatic structure parting to strong medium and coarse angular blocky; very firm; many moderately thick very dark gray (10YR 3/1) clay films on faces of peds; few small pebbles and shale fragments; mildly alkaline; clear wavy boundary.

B3—19 to 30 inches; brown (10YR 5/3) silty clay; many fine and medium greenish gray (5GY 5/1) and common fine distinct yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure parting to moderate coarse blocky; very firm; moderate medium thick gray (10YR 4/1) coatings on vertical faces of peds; common fine white masses of carbonate in lower part of horizon; few small pebbles and shale fragments; slight effervescence to a depth of 24 inches and strong effervescence below 24 inches; moderately alkaline; gradual wavy boundary.

C—30 to 60 inches; mottled brown (10YR 5/3) and greenish gray (5GY 5/1) silty clay; many fine distinct yellowish brown (10YR 5/6) mottles; massive; very firm; common fine white masses and filaments of lime; few small pebbles and shale fragments; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 28 to 42 inches, and depth to free carbonates ranges from 17 to 29 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It is predominantly silty clay loam but is silt loam in some pedons. This horizon is 6 to 8 inches thick. A B1 horizon is in some pedons. It is silty clay loam or silty clay. The B2 horizon has chroma of 1 or 2 in the matrix or on the exteriors of peds. It is silty clay or clay and ranges in clay content from 50 to 60 percent. The B2 horizon is neutral to medium acid in the upper part and slightly acid to mildly alkaline in the lower part. The C horizon is heavy silty clay loam to clay and ranges in clay content from 36 to 55 percent.

Gilford series

The Gilford series consists of deep, very poorly drained soils on broad flats and former glacial lakes. These soils are adjacent to beach ridges and in narrow swales between the ridges. They formed in sandy and loamy glacial outwash. They are moderately rapidly permeable in the upper part and rapidly permeable in the lower part. Slope is less than 1 percent.

Gilford soils are commonly near Hoopeston and Selma soils. Hoopeston soils are somewhat poorly drained. Selma soils contain more clay in the solum.

Typical pedon of Gilford fine sandy loam, in the village of Markham, in Cook County, 2,200 feet north and 110 feet west of the southeast corner sec. 24, T. 36 N., R. 13 E:

Ap—0 to 8 inches; black (N 2/0) fine sandy loam; weak fine and medium granular structure; friable; neutral; abrupt smooth boundary.

A12—8 to 11 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; friable; neutral; clear wavy boundary.

B1—11 to 16 inches; very dark grayish brown (2.5Y 3/2) fine sandy loam; moderate medium subangular blocky structure; friable; neutral; clear wavy boundary.

B21g—16 to 22 inches; dark gray (10YR 4/1) fine sandy loam; few fine faint yellowish brown (10YR 5/6) and olive brown (2.5Y 4/4) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; many thin, very dark gray (10YR 3/1) and dark gray (10YR 4/1) coats on faces of peds; neutral; abrupt wavy boundary.

B22g—22 to 27 inches; dark gray (5Y 4/1) sandy clay loam to heavy sandy loam; common fine distinct yellowish brown (10YR 5/6) and olive brown (2.5Y 4/4) mottles; weak medium prismatic structure parting to moderate angular blocky and subangular blocky; friable; common thin black (10YR 2/1) and very dark gray (10YR 3/1) coats on faces of peds; neutral; abrupt wavy boundary.

B31g—27 to 31 inches; dark gray (5Y 4/1) and gray (5Y 5/1) loamy sand; many fine and medium distinct yellowish brown (10YR 5/6) and light olive brown (2.5Y 5/4) mottles; weak coarse prismatic structure; friable; few thin very dark gray (10YR 3/1) coats on faces of peds; neutral; clear wavy boundary.

B32g—31 to 36 inches; gray (5Y 5/1) and light olive gray (5Y 5/2) loamy sand; many medium distinct olive brown (2.5Y 5/4) mottles; weak coarse prismatic structure; very friable; neutral; gradual wavy boundary.

C—36 to 60 inches; olive gray (5Y 5/2) fine sand; many medium and coarse distinct yellowish brown (10YR 5/6) mottles; single grain; loose; neutral.

The thickness of the solum ranges from 23 to 38 inches. Thickness of the mollic epipedon ranges from 12 to 20 inches.

The A horizon has value of 2 or 3 and chroma of 0 to 2. It is dominantly fine sandy loam but ranges to loam, loamy sand, and loamy fine sand. The B2g horizon has value of 4 or 5 and chroma of 1 or 2. It commonly is fine sandy loam but ranges to loamy fine sand, sandy loam, and sandy clay loam.

Grays series

The Grays series consists of deep, moderately well drained, moderately permeable soils on outwash plains on the uplands and on benches along streams. These soils formed in silty material and stratified silt and sand. Slope ranges from 2 to 5 percent.

Grays soils are similar to Barrington soils and are commonly adjacent to Barrington, Wauconda, and Zurich soils in the landscape. Barrington soils have a mollic epipedon. Wauconda soils have mottles that have chroma of 2 or less throughout most of the B horizon. Zurich soils have an Ap horizon that has value of 4 or more, or they have an A1 horizon less than 6 inches thick.

Typical pedon of Grays silt loam, 2 to 5 percent slopes, in an idle field 1 mile southwest of the city of West Chicago, in Du Page County, 1,800 feet east of center of sec. 8, T. 39 N., R. 9 E:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam; moderate medium granular structure; friable; slightly acid; abrupt smooth boundary.

A2—9 to 13 inches; brown (10YR 4/3) silt loam; weak thick platy structure parting to moderate medium granular; common thin dark brown (10YR 3/3) and very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear wavy boundary.

B1t—13 to 16 inches; dark yellowish brown (10YR 4/4) light silty clay loam; weak medium subangular blocky structure parting to moderate medium granular; friable; many thin dark brown (10YR 3/3) clay films on faces of peds; medium acid; clear wavy boundary.

B21t—16 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky

NON-COMMUNITY PUBLIC WATER SUPPLIES
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PWS ID	COUNTY	PWS CITY	PWS NAME	SERVICE AREA	SURVEY DATE	ACTIVE STATUS
			031			
		CALUMET CITY				
			10			
0073288	031	CALUMET CTY	CLAYHOLE WOODS HP 6298	20	3/21/89	A
			031			
		CALUMET CTY				
			1			
0101782	031	CHICAGO	FLATFOOT LAKE HP 5127	20	5/11/87	A
			031			
0101790	031		POWDERHORN LAKE HP 5293	20	3/23/89	A
			031			
0120055	031		WOLF LAKE FLYING FIELD HP 5067	20	4/07/88	A
			031			
0070193	031		EGGER'S WOODS HP 5298	20	4/07/88	A
			031			
0070201	031		EGGERS WOODS HP 5299	20	4/07/88	A
			031			
0073783	031		BEAUBIEN PRESERVE GR HP 5128	20	5/11/88	A
			031			
0069500	031		LABAUGH WOODS WEST HP 2120	20	5/03/89	A
			031			
0070383	031		CALDWELL WOODS 2107	20	9/10/80	A
			031			
0070391	031		CALDWELL WOODS GR 1 2108	20	6/24/87	A
			031			
0070409	031		CALDWELL WOODS 2092	20	5/03/89	A
			031			
0117556	031		ALL SAINTS CHAPEL WELL #3	13	2/08/88	A
			031			
0097055	031		MARYNOOK TAP SOUTH INC	07	2/09/88	A
			031			
0097097	031		UAW HALL LOCAL #551	12	2/29/88	A
			031			
0099978	031		WINDJAMMER MARINA	07	4/12/89	A
			031			
0119933	031		NU-CAR CARRIERS ATINGUS RENTAS	10	2/29/88	A
			031			
0074260	031		INDIAN BOUNDARY GOLF 3127	20	3/25/87	A
			031			
0074278	031		INDIAN BOUNDARY GOLF 3128	20	3/25/87	A
			031			
0076703	031		NORTHWESTERN MALT & GRAIN CO	10	8/08/88	A
			031			
0073858	031		CALDWELL GOLF COURSE HP 2116	20	5/03/89	A
			031			
0074161	031		EDGEBROOK GOLF COURSE 2136	20	5/03/89	A
			031			
0074179	031		EDGEBROOK GOLF COURSE 2135	20	5/03/89	A

NON-COMMUNITY PUBLIC WATER SUPPLIES
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PWS ID	COUNTY	PWS CITY	PWS NAME		SERVICE AREA	SURVEY DATE	ACTIVE STATUS
0070037	031	CRESTWOOD	RUBIO WOODS	5236	20	4/03/89	A
			031				
0070334	031		CONKEY FOREST	5280	20	3/28/89	A
			031				
0070342	031		CONKEY FOREST	5278	20	3/28/89	A
			031				
0080465	031		FORDMOTORCREDITSTORAGEATTN PAT		10	8/08/88	A
			031				
0101923	031		CONKEY FOREST	5279	20	3/28/89	A
			031				
0101949	031		CONKEY FOREST	5281	20	3/28/89	A
			031				
0101964	031		RUBIO WOODS	5282	20	4/03/89	A
			031				
		CRESTWOOD					
			9				
0070276	031	DES PLAINES	DAM 4 EAST	3093	20	5/17/89	A
			031				
0070375	031		CAMPGROUND RD WDS GR1	1127	20	5/25/89	A
			031				
0123562	031		TOUHY COURT NANCY'S PIZZA		10	1/17/90	A
			031				
		DES PLAINES					
			3				
0100222	031	DESPLAINES	IROQUOIS WDS	1077	20	5/17/89	A
			031				
0102020	031		TOUHY TALCOTT AREA	1071	20	5/17/88	A
			031				
0073759	031		AXEHEAD L	3073	20	5/17/89	A
			031				
0073767	031		AXEHEAD L	3090	20	5/17/89	A
			031				
0073908	031		CHIPPEWA WDS GR 2	3095	20	3/17/87	A
			031				
0073916	031		CHIPPEWA WDS	3144	20	5/17/89	A
			031				
		DESPLAINES					
			6				
0101469	031	DIXMOOR	DIXMOOR PLAYFIELD	5302	20	5/15/89	A
			031				
0102004	031		VINCENNES TRACT	5047	20	4/03/89	I
			031				
		DIXMOOR					
			2				
0122226	031	E CHICAGO HTS	M&N QUICK STOP		08	5/02/89	A
			031				

NON-COMMUNITY PUBLIC WATER SUPPLIES
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PWS ID	COUNTY	PWS CITY	PWS NAME		SERVICE AREA	SURVEY DATE	ACTIVE STATUS
0074039	031	MT PROSPECT	DAM 2 031	1063	20	5/25/89	A
0074310	031		LAKE AVE WDS EAST 031	1044	20	7/10/86	A
0074328	031		LAKE AVE EAST 031	1045	20	5/20/82	A
0074336	031		LAKE AVE EAST 031	1043	20	10/24/84	A
0102574	031		CAMP PINE 031	1047	20	5/25/89	A
0102590	031		FAMILY PICNIC AREA 031	1092	20	5/25/89	A
0102616	031		LAKE AVE WDS WEST SHELTER 031	1051	20	5/19/82	A
0115824	031		DINK'S HOT DOGS 031		07	12/14/87	A
0118133	031		ROSES ON RIVERS 031		07	4/13/87	A
0118331	031		OLD NEIGHBORHOOD 031		07	4/13/87	A
0118653	031		PIT PROS 031		08	4/13/87	A
		MT PROSPECT	17				
0018390	031	MT. PROSPECT	TAMARAK DAY CAMP 031		04	7/15/87	A
		MT. PROSPECT	1				
0070458	031	NILES	BUNKER HILL WOODS 031	2093	20	5/25/89	A
0070474	031		BUNKER HILL WOODS 031	HP2094	20	5/25/89	A
0070482	031		BUNKER HILL 031	2099	20	5/25/89	A
0070490	031		BUNKER HILL 031	2100	20	5/25/89	A
0070508	031		BUNKER HILL WOODS 031	2096	20	5/25/89	A
0073932	031		CLAYTON F SMITH WOODS 031	2095	20	5/25/89	A
0073981	031		CLAYTON F SMITH WOODS 031	2098	20	5/25/89	A
0073999	031		CLAYTON F SMITH WOODS 031	2097	20	5/25/89	A
0079582	031		CLAYTON F SMITH 031	2091	20	2/25/87	A
		NILES	9				

NON-COMMUNITY PUBLIC WATER SUPPLIES
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PWS ID	COUNTY	PWS CITY	PWS NAME	SERVICE AREA	SURVEY DATE	ACTIVE STATUS
			031			
0120279	031		PALOS SCHOOL DISTRICT 118	05	5/10/88	A
			031			
0120303	031		HACKNEY'S RESTAURANT	07	4/24/89	A
			031			
0120329	031		PALOS PARK EPISCOPAL DAY CARE	05	5/10/88	A
			031			
0121046	031		PALOS PRESBYTERIAN COMM CHURCH	13	10/06/88	A
			031			
0121863	031		ARROWHEAD LAKE 5267	20	4/12/89	A
			031			
0121871	031		ARROWHEAD LAKE 5268	20	4/12/89	A
			031			
		PALOS PARK				
			38			
0018358	031	PARK RIDGE	FT DEARBORN SCOUT CAMP	04	7/31/89	A
			031			
0070250	031		DAM 4 EAST 3088	20	5/17/89	A
			031			
0070268	031		DAM 4 EAST GR 2 3082	20	5/17/89	A
			031			
0074054	031		DAM 4 EAST 3094	20	5/17/89	A
			031			
0100669	031		FAMILY PICNIC AREA 3087	20	11/28/84	A
			031			
		PARK RIDGE				
			5			
0072025	031	PROSPECT HEIGHTS	PROSPECT HEIGHTS COMM CHURCH	13	6/16/88	A
			031			
0072033	031		SUNNIE KIDDIES FOUNDATION	05	11/06/87	A
			031			
0072041	031		ST HILARY'S EPISCOPAL CHURCH	13	1/07/88	A
			031			
0072066	031		PROSPECT CHRISTIAN CHURCH	13	6/16/88	A
			031			
0072082	031		LUTHERAN CHCH/GOOD SHEPHERD	13	1/07/88	A
			031			
0072090	031		NORTHWEST BIBLE BAPTIST CHURCH	13	1/07/88	A
			031			
0072116	031		BETSY ROSS ELEMENTARY SCHOOL	05	11/06/87	A
			031			
0072165	031		GARY MORAVA RECREATION CENTER	04	11/06/87	A
			031			
0080341	031		ROB ROY KITCHEN	04	11/06/87	A
			031			
0120451	031		SHELL MINIMART	08	6/16/88	A
			031			
0120709	031		OUR REDEEMER LUTHERAN CHURCH	13	8/31/88	A

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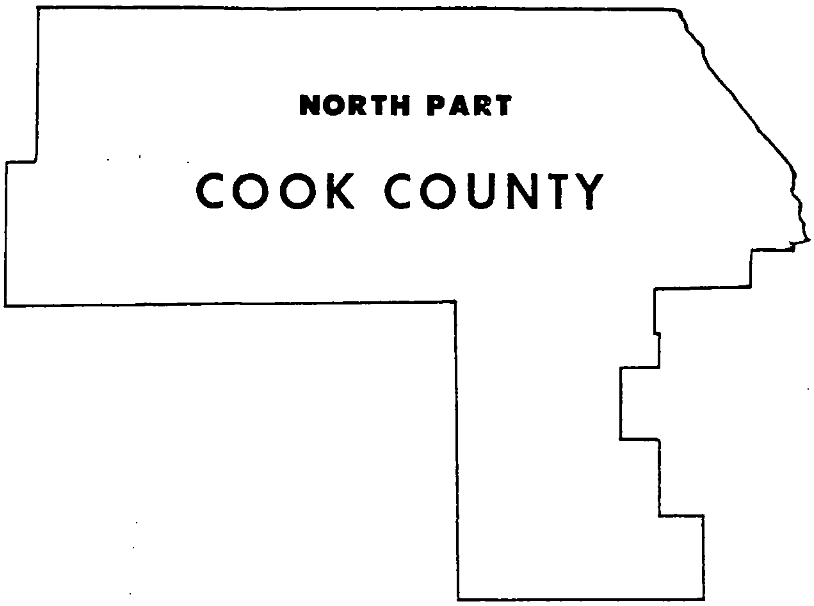
STATE-WIDE LISTING

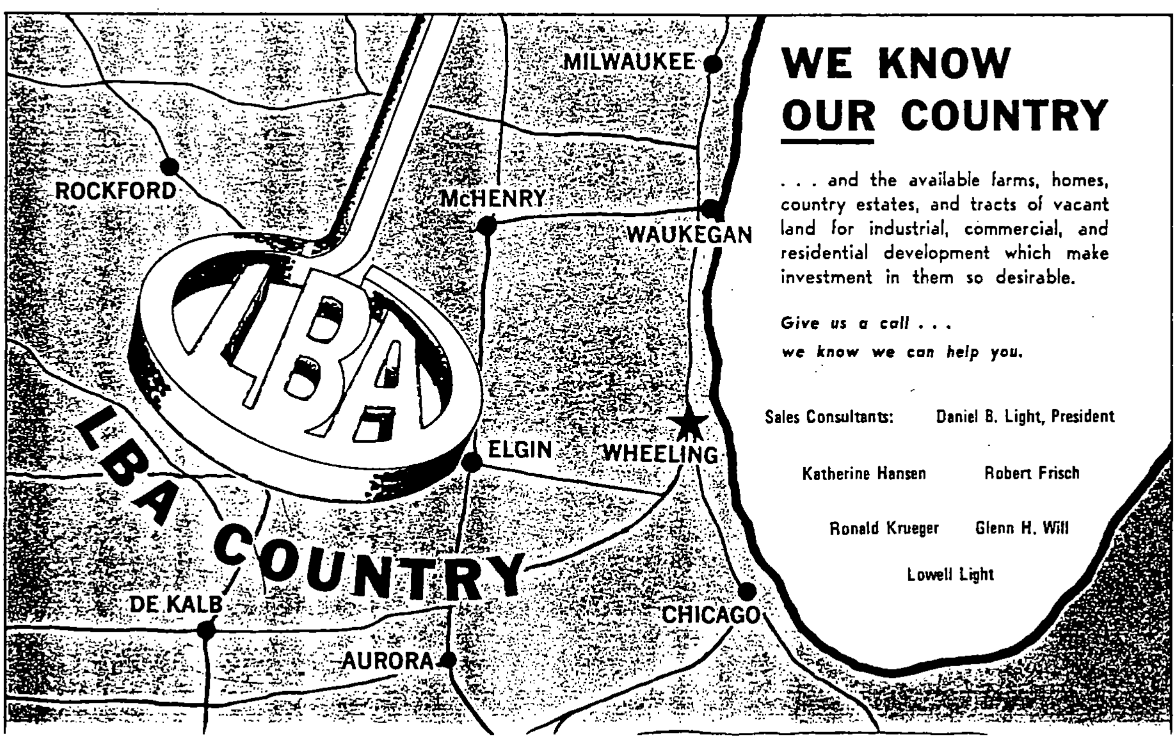
PWS ID	COUNTY	PWS CITY	PWS NAME		SERVICE AREA	SURVEY DATE	ACTIVE STATUS
0073502	031	ROSEMONT	CHEVALIER WOODS GR 3 031	3121	20	3/25/87	A
0073510	031		CHEVALIER WOODS GR 1 031	3120	20	3/25/87	A
		ROSEMONT					
			2				
0053157	031	S BARRINGTON	KLEHM CHAS AND SON 031		10	1/14/88	A
		S BARRINGTON					
			1				
0120196	031	SAUK VILLAGE	PLUM CREEK MEADOW 031	HP 6297	20	4/07/88	A
		SAUK VILLAGE					
			1				
0121707	031	SCHAMBURG	THUMPERS CAFE & BAR 031		07	12/13/88	A
		SCHAMBURG					
			1				
0118901	031	SCHAUMBERG	GAS 'N' GO 031		08	3/22/89	A
		SCHAUMBERG					
			1				
0080184	031	SCHAUMBURG	PLAZA DE LAS FLORAS 031		07	3/08/88	A
0122028	031		CHURCH OF THE NAZARENE 031		13	5/15/89	A
		SCHAUMBURG					
			2				
0069708	031	SCHILLER PARK	SCHILLER WOODS N GR14 031	3077	20	4/18/89	A
0069716	031		SCHILLER WOODS N GR 13 031	3078	20	4/18/89	A
0069724	031		SCHILLER WOODS N GR 12 031	3081	20	4/18/89	A
0069732	031		SCHILLER WOODS N GR 10 031	3079	20	4/18/89	A
0069740	031		SCHILLER WOODS GR 4 031	3111	20	4/18/89	A
0069757	031		SCHILLER WOODS 031	3084	20	4/18/89	A
0069765	031		SCHILLER WOODS N GR 1 031	3115	20	4/18/89	A
0073700	031		ROBINSON WOODS S GR 2 031	3112	20	4/18/89	A

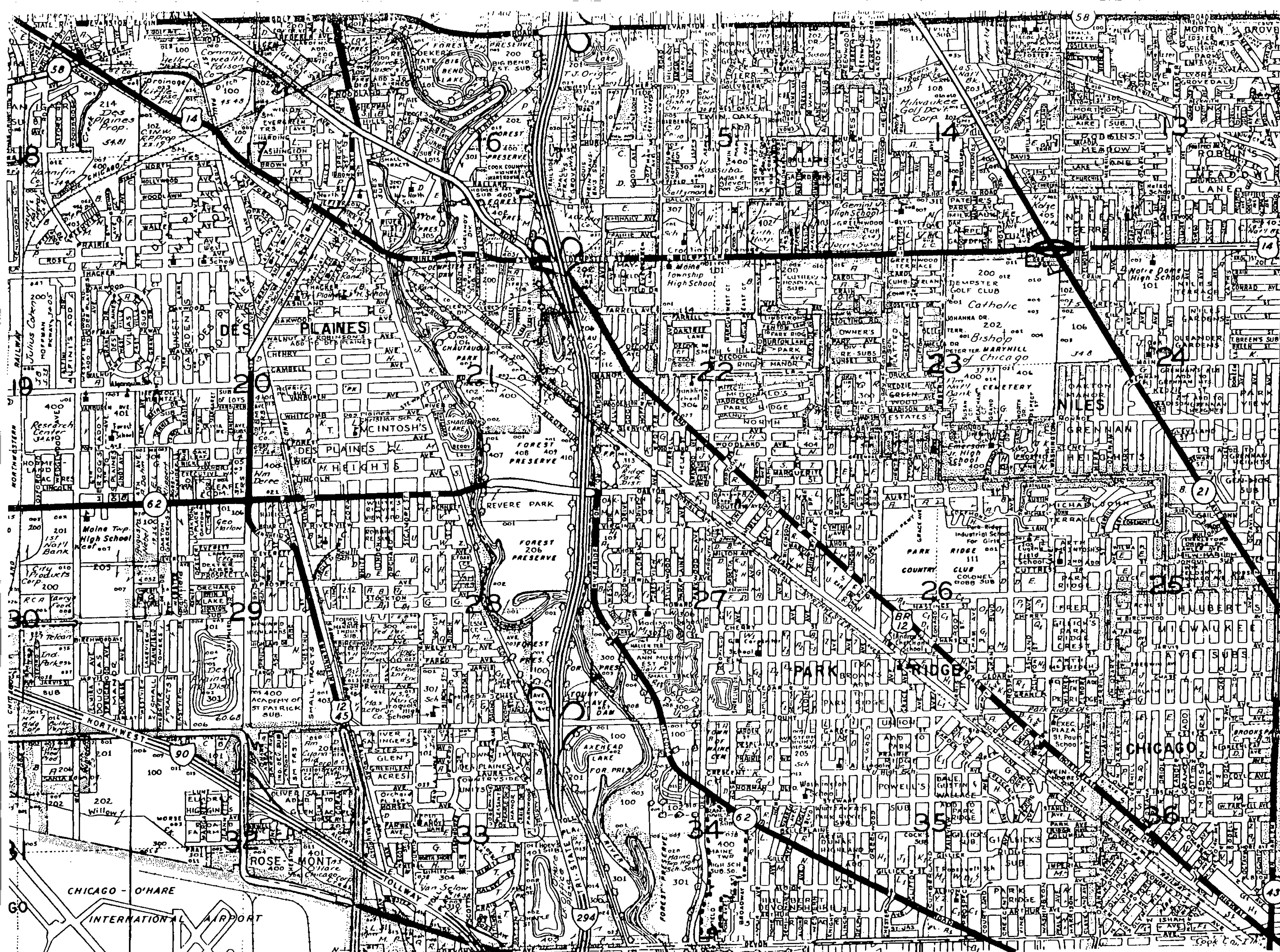
NON-COMMUNITY PUBLIC WATER SUPPLIES
STATE-WIDE LISTING

PWS ID	COUNTY	PWS CITY	PWS NAME		SERVICE AREA	SURVEY DATE	ACTIVE STATUS
0073890	031	SCHILLER PARK	CHE CHE PIN QUA GR 1	3083	20	4/18/89	A
			031				
0074484	031		SCHILLER WOODS N GR 9	3072	20	3/12/88	A
			031				
0074492	031		SCHILLER WOODS GR 12	3074	20	4/18/89	A
			031				
0074500	031		SCHILLER WOODS	3075	20	4/18/89	A
			031				
0074518	031		SCHILLER WOODS	3076	20	4/18/89	A
			031				
0074526	031		SCHILLER WOODS N GR 11	3080	20	4/18/89	A
			031				
0074542	031		SCHILLER WOODS N	HP 3094	20	9/11/80	A
			031				
0074559	031		SCHILLER WOODS	3102	20	5/17/83	A
			031				
0074567	031		SCHILLER WOODS GR 6	3110	20	4/18/89	A
			031				
0074575	031		SCHILLER WOODS N GR 7	3114	20	5/12/88	A
			031				
0100628	031		SCHILLER WOODS	3070	20	4/18/89	A
			031				
0100644	031		SCHILLER WOODS	3085	20	5/12/88	A
			031				
0100685	031		FAMILY PICNIC AREA	3096	20	4/18/89	A
			031				
0100693	031		SCHILLER WOODS	3097	20	4/18/85	A
			031				
0100727	031		FAMILY PICNIC AREA	3116	20	4/18/89	A
			031				
0101998	031		SCHILLER WOODS N GR 10	3071	20	5/02/88	A
			031				
0102335	031		FAMILY PICNIC AREA	3086	20	4/18/89	A
			031				
		SCHILLER PARK					
			25				
0102251	031	SCHILLER PK	IRVING CUMBERLAND AREA	3218	20	9/16/80	A
			031				
		SCHILLER PK					
			1				
0118232	031	SCHUAMBERG	FRANKLY YOURS		07	3/21/89	A
			031				
		SCHUAMBERG					
			1				
0101840	031	SD CHGO HTS	SAUK TRAIL WOODS N	6283	20	3/26/87	A
			031				
		SD CHGO HTS					



ATLAS and PLAT BOOK





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